

MILITARY MEDICINE

ORIGINAL ARTICLES

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Twenty Thousand Blood Transfusions*

By

CAPTAIN JOHN J. ENGELFRIED, MSC, U. S. Navy; LIEUTENANT ESTELLA M. HENDERSON, NC,
U. S. Navy; and LIEUTENANT JANE EMERY, NC, U. S. Navy

A SEQUENCE of procedures was devised in 1948, at the U. S. Naval Medical School, to detect any possible error in the process of selecting a compatible unit of blood for a recipient.¹ During the past nine years this procedure or some modification of it has been used rather extensively in the blood banks throughout the Naval Service as well as in other blood banks. It is intended in this presentation to re-emphasize the outstanding features of this system; and to present the results obtained in this Blood Bank in the past three years.

THE IDENTIFICATION TAG. The three section IDENTIFICATION TAG is believed to be the outstanding single factor in preventing serious transfusion reactions. The transfusion number is previously stamped on each of the three sections. These transfusion numbers are consecutive numbers which are never duplicated. When the request for a unit of blood is received and entered in the blood bank log, the recipient's name is transcribed on each section of the identification tag. Before the specimen for the cross-match is drawn by the blood bank technician the patient must be identified by

a staff corpsman, nurse or medical officer who signs the middle section of the identification tag. This section is attached to the tube(s) of blood used for the cross-match. The blood bank technician secures the top section of each identification tag to the patient's bed or to the patient if in the Receiving Ward, where it remains until the transfusion is completed or released. Each identification tag on a patient's bed signifies that one unit of blood has been cross-matched and is being held for him in the blood bank. If the patient should be transferred to another ward or taken to the operating room the "bed" identification tags are transferred with him. The third (lower) section of the identification tag is secured to the bottle of blood that is cross-matched for the patient. This portion of the tag remains on the unit of blood during the transfusion. When the unit of blood is to be administered, the medical officer compares the TRANSFUSION NUMBER and the NAME on the lower section of the identification tag on the unit of blood to the TRANSFUSION NUMBER and NAME on the top section of the tag attached to the recipient's bed. On completion of the transfusion the corresponding bed identification tag is removed from the recipient's bed and returned with the empty blood bottle to the blood bank.

COLLECTING BLOOD FOR THE CROSS-MATCH. A few years ago a major change was found to be necessary in the procedure of collect-

* From the Blood Bank, U. S. Naval Hospital, San Diego, Calif. The opinions or assertions contained herein are the private ones of the writers, and are not to be construed as official or reflecting the view of the Navy Department or the Naval Service at large.

ing the blood specimen for the cross-match. Previously, if two or three patients were to be cross-matched on the same ward a technician labeled the tubes with the patient's name in the blood bank and made his trip to the ward collecting all specimens. Two errors resulted when specimens were placed in wrong tubes. To avoid recurrence of such errors all technicians are limited to drawing blood from only one patient and returning to the blood bank. It is fully realized that this change greatly increased the amount of work involved in setting-up a cross-match; however, it is believed to be necessary and justified, to prevent that occasional fatal transfusion reaction.

THE ABO SUBGROUPS. The subgroups of the ABO factor are considered of utmost importance.² The slight increase of work required to perform subgrouping is insignificant in relation to its value. The subgrouping is performed routinely on the blood specimens of all recipients and donors at the same time as the ABO typing. The anti-A₁ (absorbed B) serum can be made in the blood bank if necessary. It is believed that the results obtained because of adhering to the subgroups of the ABO factor in the selection of a suitable donor are well worth the effort required, since it is very seldom that incompatible cross-matches are encountered in this Blood Bank. Furthermore, it is believed that fewer minor transfusion reactions are encountered.

NON-USE OF PILOT TUBES. Pilot tubes are not used in this Blood Bank when cross-matching a unit of blood. However, pilot tubes are used when processing the blood. Before entering the bottle of blood it is carefully examined for evidence of hemolysis, contamination or lost vacuum which may be detected by a rise of the blood level in the glass airway tube. Tincture of iodine is used to sterilize the rubber stopper. If the unit of blood is released and reset for another patient the bottle is entered for the second or third occasion.

The following criteria is used in decid-

ing the retention or rejection of a unit of blood:

1. The bottle has not been entered more than three times.
2. The time interval between the first and last entry was not more than seven days.
3. A satisfactory vacuum is present in the bottle.
4. The plasma of the centrifuged specimen removed from the bottle shows no evidence of hemolysis.

It is very well realized that this procedure of entering the donor's container of blood has been criticized; however, it is believed that it is justifiable to prevent the possibility of administering hemolyzed or partly hemolyzed blood. Furthermore, if the blood bank technician is not capable of adhering to sterile technic he should not be permitted to perform the duties and responsibilities of a blood bank technician.

To further study the probability of contamination of the blood when entering the containers, aliquots of the blood removed from the bottles were cultured.

CROSS-MATCH TECHNIQUE. No change has been necessary during this past decade in the procedure of performing the cross-match. The recipient's serum or donor's plasma undiluted is used in making all cell suspensions to obtain a high protein concentration in the cross-match. This method has detected any incompatibility between the donor's and recipient's blood.

RESULTS

This report presents the results obtained in this Blood Bank from 14 September 1953 to 3 January 1957 on which date the 20,000th blood transfusion was administered. These transfusions were given to 6,440 different recipients.

DISTRIBUTION OF BLOOD GROUPS. The blood groups of the recipients are recorded in Table 1. This distribution of blood groups is comparable to that reported in recipients and donors encountered in various blood banks of the Naval Service.

TABLE 1
DISTRIBUTION OF BLOOD GROUPS IN RECIPIENTS

| ABO Type | Rh _o Type | Number of Recipients | Percent |
|-----------------------|----------------------|----------------------|---------|
| O | positive | 2584 | 40.1 |
| O | negative | 473 | 7.3 |
| A ₁ | positive | 1695 | 26.3 |
| A ₁ | negative | 310 | 4.8 |
| A ₂ | positive | 408 | 6.3 |
| A ₂ | negative | 105 | 1.6 |
| A ₃ * | positive | 1 | |
| B | positive | 569 | 8.8 |
| B | negative | 91 | 1.4 |
| A ₁ B | positive | 127 | 1.9 |
| A ₁ B | negative | 17 | 0.3 |
| A ₂ B | positive | 49 | 0.8 |
| A ₂ B | negative | 11 | 0.2 |
| Total Rh _o | positive | 5433 | 84.4 |
| Total Rh _o | negative | 1007 | 15.6 |

* An A₀-negative patient was satisfactorily cross-matched but was not transfused, therefore is not included in this table.

MULTIPLE TRANSFUSIONS. Forty-five percent (2,919 recipients) received only one unit of blood. 1,401 received two and 701 received three units. Approximately 78 percent of the recipients received not more than three units of blood from this Blood Bank. Eight recipients received more than 50 units, with three of these receiving more than 100 units. One patient required 202 transfusions in addition to 8 units administered prior to this study.

TRANSFUSION OF OTHER THAN TYPE-SPECIFIC BLOOD. A substitution of blood type was made in 478 blood transfusions involving 277 recipients. The motive for these substitutions can be classified into four categories.

(1) *New-born infants.* All infants less than one month of age requiring a blood transfusion were given ABO type specific, but Rh_o-negative blood. Eighty-nine infants were in this category of which 39 were erythroblastotic, receiving 66 units.

(2) *Extreme emergency transfusions, without a cross-match.* Sixteen units of O-negative blood with A and B group-

specific substances for eleven patients, without a cross-match. Five other patients received low titer O-negative blood without A and B substances added. During extreme emergency circumstances an A₁, Rh_o-positive patient who had been previously transfused by this Blood Bank was given a known A₂, Rh_o-negative unit of blood without a cross-match. This unit of blood was previously cross-matched and held in reserve for another patient, therefore was considered to be a proven type. Later a cross-match with this unit and the recipient's blood was found to be satisfactory.

(3) *Necessary substitutions.* In 89 transfusions involving 29 recipients it was necessary to make a substitution of blood type. Twelve A₂-negative patients received 31 units of A₁-negative blood. Type specific blood was not available for two B-negative patients, one of which received one low titer O-negative with group-specific substances and the other was given one O-negative unit with A and B substances followed by six units of B-positive blood. The B-positive was given when it was realized that the patient would require a large volume of blood within a short period of time.

Two A₁ B-positive patients received six A₁ B-negative, eight A₂ B-positive and one A₂ B-negative units. Seven A₂ B-positive patients received a total of seven A₁ B-positive, three A₁ B-negative, two A₂ positive, four B-positive, and one O-negative units. Seventeen units of A₁ B-negative and one unit of A₂ negative blood were given to six A₂ B-negative recipients.

(4) *Substitution to Prevent Loss of Blood.* The largest of the four categories was a group of 142 patients receiving 218 units of non-specific type blood in order to prevent the loss of this blood when it became apparent that the blood would expire if not used. Eighty-two units of Rh-negative blood were given to Rh-positive recipients and the other 136 units were either A₂ or A₂ B given to A₁ or A₁ B patients.

Difficulty in determining the Rh_o factor was encountered in four patients. There-

fore, even though these patients were thought to be Rh_s positive, they were given 12 units of negative blood.

SERIOUS ERRORS INVOLVING THE ADMINISTRATION OF BLOOD. During the administration of these 20,000 blood transfusions five serious errors occurred. The blood bank was entirely responsible for one error while the ward medical officers were at fault for the other four.

A student blood bank technician transferred blood obtained from a patient for a cross-match into a tube labeled with another patient's name. The error was repeated in obtaining blood from the second patient, resulting in a type B Rh_s-positive individual receiving a unit of O blood. No reaction was observed in the recipient following the transfusion. Several days later when a second unit of blood was requested the previous error was detected. The transfusion requested for the other patient, who was a type O and would have received type B blood, was cancelled.

To prevent the recurrence of a similar instance the blood bank regulations were modified, restricting the blood bank personnel to collecting blood from only one patient on each trip from the blood bank.

The other four errors were the results of failure of the medical officers to properly compare the bed identification tag with the tag attached to the containers of blood. Only one of the four errors resulted in a hemolytic or incompatible reaction.

TRANSFUSION REACTIONS. A total of 288 (1.44%) transfusion reactions were reported of which 206 or 1.03 percent were allergic, 81 or 0.40 percent were recorded as pyrogenic, and one hemolytic. The distribution of the blood groups involved in these reactions is illustrated in Table 2.

ALLERGIC REACTIONS. The 206 allergy reactions involved 186 recipients. Twelve of these recipients had two allergic reactions and four had three reactions. Two of the recipients also had a pyrogenic reaction. An attempt was undertaken to classify these reactions according to the degree of severity and time of onset as shown in Table 3.

TABLE 2
DISTRIBUTION OF BLOOD GROUPS IN TRANS-FUSION REACTIONS

| Blood Group | Allergic Reactions | | Pyrogenic Reactions | |
|--------------------------|--------------------|---------|---------------------|---------|
| | Recipients | Percent | Recipients | Percent |
| O | 96 | 51.6 | 38 | 48.1 |
| A ₁ | 62 | 33.3 | 29 | 36.7 |
| A ₂ | 11 | 5.9 | 4 | 5.1 |
| B | 15 | 8.1 | 5 | 6.3 |
| A ₁ B | 1 | 0.5 | 1 | 1.3 |
| A ₂ B | 1 | 0.5 | 2 | 2.6 |
| Rh _s positive | 165 | 88.7 | 64 | 81.1 |
| Rh _s negative | 21 | 14.3 | 15 | 18.9 |

In 80 percent the only evidence of a reaction was urticaria. Forty-one recipients had additional symptoms, the most frequent being pruritus which occurred in 20 instances. Edema was an accompanying factor in 9 patients, a chill with tremor in six, and a temperature elevation of 104.6 with a shaking chill was reported in one of the four marked reactions. One instance of each of the following complications was also reported: Collapse, a temperature elevation to 100 degrees, restlessness, a shaking chill, drop in blood pressure, abdominal cramps, and tachycardia. In nine recipients the first evidence of a reaction was not detected until after completion of the transfusion. This delay was less than one hour in seven instances while in one case the first evidence of a reaction was not detected until two hours and the other six hours after completion.

The majority of these recipients received medication as soon as the first clinical evidence was noted. In only two patients (one 2½ hours, the other 6 hours) the reaction was reported as lasting longer than one hour.

PYROGENIC REACTIONS. The 81 pyrogenic reactions were reported in 79 recipients, as shown in Table 4. The most prevalent symptom was a chill, with or without tremor. Five reactions occurred without a chill. A

TABLE 3
ALLERGIC REACTIONS—RESULT OF BLOOD TRANSFUSIONS

| Time of Onset of Reaction | Intensity of Urticaria | | | Urticaria With Complications | Total Reactions |
|--|-----------------------------------|------|-------------|------------------------------------|--------------------|
| | Slight (Without complications) | Mild | Generalized | | |
| Beginning of Transfusion (Within first 100 ml.) | 4 | 3 | 2 | 3 | 12 |
| During Transfusion (100 ml.-400 ml.) | 18 | 31 | 33 | 28* | 110 |
| Completion of Transfusion (400 ml. or more) | 22 | 24 | 18 | 11 | 75 |
| After Completion | | | | | |
| Within one hour | 3 | 1 | 3 | | 7 |
| Within two hours | | | 1 | | 1 |
| Within six hours | | | 1 | | 1 |
| Total Reactions | 47 | 59 | 58 | 42 | 206 |

* One recipient had intense pruritis without any other symptom.

temperature elevation was reported in 25 reactions, three of which were over 102 degrees (104, 104, 104.4).

Additional symptoms reported were muscle pains, encountered in four patients, headache in three, general malaise in two, and two complained of nausea. In all except four recipients the reactions subsided within an hour after the transfusion was discontinued. Three reactions continued for a few hours and one persisted until the following morning.

HEMOLYTIC REACTION. One incompatible or hemolytic reaction occurred. The medical

officer administering the unit of blood neglected to properly compare the identification tag on the unit of blood with the corresponding tag on the patient's bed resulting in a type "O" patient receiving a few ml. of A₁ blood. The only clinical evidence of a transfusion reaction was an immediate shaking chill. The transfusion was stopped and the error was then detected. There was no hemoglobinuria. The anti-A agglutinin titer of the recipient's serum showed a marked rise, from an anti-A titer of 1:64 (specimen taken for the cross-match a few hours prior to the administration of the unit of A₁

TABLE 4
PYROGENIC REACTIONS—RESULT OF BLOOD TRANSFUSIONS

| Time of Onset | Shaking Chill | | Chill without Tremor | | Without Chill | |
|--|--------------------|----------------------|----------------------|----------------------|--------------------|----------------------|
| | Normal Temperature | Elevated Temperature | Normal Temperature | Elevated Temperature | Normal Temperature | Elevated Temperature |
| Beginning of Transfusion (Within first 100 ml.) | 3 | | | | 1 | |
| During Transfusion (100 ml.-400 ml.) | 28 | 10 | 9 | 5 | | 4 |
| Completion of Transfusion (400 ml. or more) | 6 | 2 | 3 | 3 | | 1* |
| Within one hour after Completion | 1 | | 5 | | | |

* This recipient complained only of generalized pain and malaise.

blood) to a titer of 1:1024 six days later when the patient was discharged from the hospital.

POSSIBILITY OF OTHER SENSITIZATION. The possibility of the Kell or Duffy factor being responsible for any of these reported allergic or pyrogenic reactions was also considered. The recipient and donor blood involved in 48 allergic and 26 pyrogenic reactions was tested for these agglutinogens. Sensitization could have occurred (the agglutinogen absent in the recipient's blood and present in the donor's blood) in 21 of the 74 reactions investigated. However, no Anti-Kell or Anti-Duffy antibodies could be detected in the serum of any of the 74 recipients.

The possibility of sensitization due to some other factor known or unknown, was also considered. Following 64 transfusion reactions, of which 22 were pyrogenic and 42 allergic, cross-matches were repeated with the original blood specimen and with a second blood specimen obtained 6-10 days after the transfusion reaction. In each instance these cross-matches were performed with and without the addition of anti-globulin serum. All cross-matches were compatible.

BACTERIAL CONTAMINATION. As previously stated the aliquots of blood obtained from the donor's blood bottle were cultured in thioglycollate medium. These specimens were obtained from 110 consecutively entered units, of which 76 were first entry, 27 were second and 7 third entry. All cultures were negative.

SUMMARY

During the past nine years very few modifications have been necessary in the Blood Bank procedures devised at the U. S. Naval Medical School in 1948. The results

obtained in this Blood Bank with the administration of 20,000 blood transfusions aid to substantiate previously published reports.

The three section IDENTIFICATION TAG has prevented many serious errors; however, it is not fool-proof, the medical officer administering the blood transfusion must compare the patient's bed identification tag with the tag on the unit of blood. These results show that four errors were made in the administration of these 20,000 blood transfusions by the medical officer when comparing the identification tag attached to the patient's bed with the tag attached to the unit of blood. Fortunately, no serious results occurred in these four recipients.

One error was made by a blood bank technician resulting in a modification of the procedure for collecting the patient's blood for the cross-match. The technician can collect blood from only one patient on one trip from the blood bank.

A total of 288 transfusion reactions were reported, of which 206 (1.03%) were classified as allergic, 81 (0.4%) as pyrogenic and 1 (0.005%) hemolytic. No clinical evidence of any of these reactions, including the hemolytic reaction remained longer than approximately 12 hours.

Further investigation of 74 of the transfusion reactions revealed no evidence of sensitization to the Kell or Duffy factors.

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THE RED CROSS DESERVES OUR SUPPORT

Background for a Safe Blood Transfusion Service— A Continuous Training Program

By

CAPTAIN FRANK R. CAMP, JR., MSC, U. S. ARMY*

(With two illustrations)

SOME of the newly discovered blood factors have been first recognized by workers in small institutions who were confronted by puzzling findings, especially in the crossmatching tests, transfusion reactions and in hemolytic disease of the newborn. Every technician in a blood bank has an opportunity to make such contributions.¹ A problem interfering with the safe operation of Blood Transfusion Services today is the *failure* of a technician to *recognize* when he is confronted with an immunohematological difficulty requiring variation in technique, and, more important, that technical advice is needed.

Specific anti-sera and reagents are available for use in the modern hospital laboratories of the United States Army. However, proper use and interpretation of results obtained with these anti-sera are greatly enhanced when the technician understands the *genetic terms involved*. This article describes a year round training program and suggests several methods of teaching laboratory technicians the theory and practical application involved in pertinent immunohematological techniques.

METHODS

Of prime importance is the strict adherence to the reagent instructions prepared by the manufacturers. Since the directions may be changed from time to time, it should be stressed to the technician that he routinely read the instruction sheet accompanying anti-sera.²

* From Department of Preventive Medicine, Army Medical Service School, Brooke Army Medical Center, Fort Sam Houston, Texas. Now at USAREUR Medical Laboratory, APO 180, New York, N.Y.

A laboratory technician can best be introduced to the blood-group antigens and antibodies by discussing *Mendelian inheritance*. Serological reactions have more meaning when the technician is familiar with the following genetic terms:

1. Gene
2. Chromosome
3. Germ cells
4. Zygote
5. Homozygote
6. Heterozygote
7. Mitosis
8. Meiosis
9. Haploid
10. Diploid
11. Genotype
12. Phenotype
13. Dominant
14. Recessive
15. Autosome
16. Sex chromosome
17. Alleles (Multiple)
18. Locus
19. Somatic cell
20. Mutation
21. Fertilization
22. Gametogenesis
23. Cytogenetics
24. Homologous
25. Chromatin
26. Nucleolus
27. Nucleus

Presenting the technician with only the immunological aspects involved in the detection of blood group antigens and antibodies evades one of the problems that the technician will face as soon as he is required to work semi-independently; i.e. interpretation of the serological results.

REFRESHER TRAINING FOR MEDICAL OFFICERS

The program should also include "refresher training" for all medical officers who request blood from the Blood Transfusion Service. This program can be achieved by having the blood transfusion service set up 10, 20 or more crossmatches to be read by all medical officers who may need refresher training along this line. At the same time the over-all operation of the blood bank, in-

cluding blood grouping methods, Rh typing, and the specific crossmatch technique, should be explained and demonstrated to the medical officers. One of the most frequent difficulties encountered by persons who are in need of refresher training in reading crossmatches is rouleaux formation. The characteristic appearance of this cellular formation can be mistaken for agglutination. Use of the 4 mm. objective will aid in identifying rouleaux formation even prior to using physiologic saline for dispersion of the cells. Red blood cells enmeshed in fibrin webs and representing pseudoagglutination should be demonstrated in the "refresher training" program.³

DECISION AND RESOLUTION—ROLE OF THE LABORATORY OFFICER

The immunohematological emergency arising late at night too often is thrown on the shoulders of relatively inexperienced technicians for decision and resolution. This problem exists despite steps to prevent its occurrence. Neither the basic technician nor most senior technicians can be expected to solve complicated blood problems. This is the role of the laboratory officer—indeed that of an immunohematologist. Advice for such problems can be obtained by letter or telephone, if need be, from leading military immunohematologists. Time and distance, however, sometimes hamper this solution. Therefore, once a pattern for solving the particular problem is put in motion by the *laboratory officer* he should feel secure that the technician assisting him is competent in his serological technique, can follow orders to the letter and is able to follow the course of events by having a *working knowledge of genetics*.

TECHNIQUES

Technicians should receive instruction and actual practice during the laboratory training program in the following serological techniques:

1. ABO Blood Grouping
2. Confirmation Test

3. A method to titer Group O blood
4. Rh typing
5. Genotyping
6. Detection of D⁺ bloods
7. Use of Coombs' serum
8. Crossmatch Techniques: Saline and High Protein Methods
 - a. Saline-cell suspensions
 - b. Bovine albumin
 - c. Homologous serum-cell suspensions
 - d. Coombs' serum

The importance of the confirmation test must be emphasized. Technical Manual 8-227, *Methods for Laboratory Technicians*, should be followed in the above techniques where described.

CURRENT TECHNICAL CHANGES

For blood bank technicians issuing blood as well as medical officers ordering blood for their patients attention is called to Change 1 in Department of the Army Technical Bulletin 204 (Nov. 2, 1953). This reports the danger of giving large transfusions of universal donor blood to patients of group A, B, or AB and following this therapy by giving group specific blood within two weeks. The bulletin further states that when a patient has received a transfusion of group O blood in excess of 4 pints and requires subsequent transfusions within a period of two weeks he should receive group O blood regardless of his hereditary group. Emergency cases receiving multiple units of group O blood prior to specific grouping represent a special problem. Again the blood bank technician is in a unique position. Accurate count of units of blood issued to a patient receiving blood in the emergency room and then moved directly to surgery can often be accomplished only by the blood bank technician.

DEMONSTRATIONS

Certain important problems should be stressed to the technician including the handling of an autoagglutinin and of the rouleaux factor. In addition, demonstrations should be set up showing what happens

when saline, albumin or the Coombs' reagent becomes contaminated.⁴ These demonstrations, emphasizing the use of controls, should be routine in a laboratory's year round training program.

MAKING A SAFE DECISION

Another key in training competent blood bank technicians is that in regards to every immunohematological situation, routine and emergency, day and night, the technician should *think* and then make a *safe decision*. Following are some points reflecting safe decision instruction:

1. Only *well trained* and *conscientious* technicians should be allowed to work in a Blood Bank.
2. All steps of Blood Banking, Blood Grouping and Blood Transfusion are highly important.
3. Despite recent advances in crossmatch technique "clerical errors" are responsible for *many hemolytic transfusion reactions*.
4. There should be no hesitancy in calling for technical assistance when in doubt or when the workload is heavy.
5. The operation of a blood bank is no safer than its least experienced technician.⁵

There is no saturation point to this type of instruction. The most important factor to be stressed is the patient's welfare throughout such training. Most of the material for this type of instruction must come from personal experience.

CHECK AND RECHECK

One point of practice and instruction that stands by itself in importance in training a competent blood bank technician is stressed in the words "Check and Recheck." Every step from the bleeding of the donor to the determination of the proper recipient must be performed confidently and accurately. By incorporating in the routine the practice of Check and Recheck, the chances for tragic errors are likely to be minimized. Various "systems" have been described which are designed to prevent blood bank errors. In the final analysis the key to the problem is still

the technician who in addition to being well trained, alert, and conscientious, must "THINK."⁶ Figure 1 shows a technician re-checking a unit of blood and the transfusion request papers before issuing the bottle of blood to a ward. Figure 2 shows the refrigerator plainly marked with constant reminders designed to caution the technician, especially during a period of rush and emergency.

RESULTS

The results of a training program can best be evaluated during an emergency. The suggestions listed in this paper for a laboratory training program are broad enough to apply to large and small laboratories. However, they are especially useful for hospital laboratories overseas.⁸

DISCUSSION

Upon assignment to a laboratory service, rotation through the various departments is generally mandatory for the new technician. This prepares him for a permanent section assignment and night duty. His instruction in the Blood Transfusion Service should be stressed especially. Training should be continuous for new arrivals as well as all members of the staff who work in the Blood Bank day or night.

A Laboratory Training Program with particular emphasis on all phases of Blood Banking is the responsibility of the Laboratory Officer. It is his first duty to insure that human carelessness is "ruled out" in the Blood Transfusion Service. He can accomplish this ounce of prevention by conducting a vigorous training program. Opposition to such a program is that large laboratories have too many technicians to train, small laboratories, not enough technicians to carry out daily routine work, and both, a shortage of time. None of the complaints are justified. Only the *initiative* is lacking. The training program described in this paper can be carried out in both large and small laboratories by adherence to these points:

1. Periodic rotation of all personnel



FIG. 1. Technician must recheck his work.

through the Blood Bank on a year round basis. (Provide each technician with a copy of the Blood Bank Standing Operating Procedure and give appropriate instruction.)

2. Distribution of current literature on immunohematology for all laboratory personnel to read and initial.

3. Classes of instruction and seminars. (At night, if necessary.)

4. Written examinations.

5. Critique.

Nothing tests the efficiency of a laboratory staff like working together, as a team, during a disaster in which there are numerous casualties requiring large quantities of blood. The *danger spots* of a Blood Transfusion Service are wide open during such periods. Everyone, from the civilian technician who has been on the staff for 10 years to the new soldier-technician who arrived 10 days ago, must carry a full load. Each one must work rapidly and yet check and recheck all steps from donor bleeding to issue of blood. As the hours pass and the situation comes under control the results of the laboratory Blood Bank training program can best be appreciated. A laboratory staff has the highest esprit de corps during such periods of teamwork.

SUMMARY

1. In addition to *emphasizing controls in serological technique* the following points

should be stressed in a Laboratory Blood Bank Training Program:

a. Strict adherence to reagent instructions prepared by manufacturers.

b. Genetic terms and their relationship to a better understanding of an otherwise complex nomenclature in immunohematology.

c. Refresher training program for all medical officers requesting blood for their patients.

d. Decision and resolution of immunohematological problems as the role of the laboratory officer.

e. Emphasis on the confirmation test.

f. Current technical changes and their adoption by the laboratory.

g. Errors arising in the use of contaminated reagents.

h. Factors involved in making a safe decision in routine work.

i. The *checking and rechecking* of all steps from donor bleeding to issue of blood.

2. Rapid integration of newly assigned technicians into the Blood Transfusion Service with proper indoctrination in the particular standing operating procedures of the laboratory is urged.

3. A continuous, year round, on-the-job training program in all phases of Blood Banking and Blood Grouping for *all* members of the laboratory staff is recommended, emphasis being placed on the factor of *team-work*.



FIG. 2. Constant reminders are boldly printed on blood bank refrigerators.

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**FOURTH CLASS FOR MEDICAL OFFICERS, DEPARTMENT OF NUCLEAR MEDICINE, U. S. NAVAL MEDICAL SCHOOL, NATIONAL NAVAL MEDICAL CENTER, BETHESDA, MARYLAND***Official U. S. Navy Photo*

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Electromyographic Observation as an Aid in Clinical Diagnosis

By

M. K. NEWMAN, M.D.,* AND KERWIN STIEF, A.B.†

(With one illustration)

THE electrical activities generated by muscles can be analyzed by means of an electronic instrument equipped with a sound amplifier and a device for permanent recording of the observed electromyogram, whether this be by tape and/or synchronized camera. The purpose of this discussion is to demonstrate the procedure of electromyography and to point out its use in clinical diagnosis.

BASIC PHYSIOLOGIC CONCEPTS OF ELECTROMYOGRAPHY

When a skeletal muscle contracts, it produces an electrical current due to voluntary motor activity. The unit of action of this voluntary activity is the motor unit, which consists of one anterior horn cell, axon, and a group of 100 to 150 muscle fibers. A skeletal muscle at rest has no electrical activity unless it is separated from its anterior horn cell, motor spinal nerve root or peripheral nerve; then it fibrillates. This involuntary activity is microscopic and can be seen only by removing the skin and fascia. By the use of the electromyographic instrument, the physical barrier is removed and it permits observation of the inner activity in voluntary muscle.

ELECTROMYOGRAPHIC CHARACTERISTICS

Normal muscle at rest has electrical silence, characterized by a simple base line in the oscilloscope. With voluntary effort the *normal motor units* are generated, and these have a diphasic or triphasic potential form on the oscilloscope, with a characteristic knock-

ing sound in the audioamplifying system. Should the needle be inserted into an intramuscular nerve fiber, the characteristic negative nerve fiber activity is seen and a rapid clicking, usually subsiding within 20 seconds, results. This activity differentiates intramuscular nerve fiber insertion from the denervation fibrillation, the latter being pathologic. The denervated muscle attempts to maintain its viability when separated from its anterior horn cell, spinal motor root or peripheral nerve. Being a hyper-irritable muscle, a needle insertion produces activity consisting of positive sharp wave and mechanical fibrillation, followed by spontaneous fibrillation, all of which have a characteristic clicking sound. In the human, this denervation fibrillation does not appear until 18 to 21 days after injury. This recording of the denervation fibrillation potential is pathognomonic of lower motor neurone disease; this forms the basis of clinical electromyography. The earlier signs of regeneration occurring with voluntary effort are *nascent motor units*. With regeneration, these increase in size on voluntary effort, and are termed *polyphasic units*. They may also exist in nerve degeneration and have a characteristic chugging sound like a motorcycle. *Giant motor units* occur in partial and old nerve lesions, in anterior horn cell disease, to compensate for atrophy; they represent hypertrophied muscle fibers. Dystrophic activity is the result of primary myopathic changes as occur in muscular dystrophy. This consists of a large number of small normal motor units generated during voluntary activity, completely disappearing at rest. Hence, these changes cannot be confused with denervation fibrillation. There may be as many as 30 or 40 complexes of small amplitude in the field, as compared to four or five normal motor unit complexes. Myotonic activity occurs

* Consultant, Physical Medicine and Rehabilitation, Veterans Administration Regional Office, Detroit, Michigan.

† Clinical Fellow, Physical Medicine and Rehabilitation, National Foundation for Infantile Paralysis.

spontaneously on needle insertion and has a characteristic "dive bomber" effect.

In upper motor neuron lesions the electromyograph records only normal potentials on voluntary activity and none at rest, except as modified by the degree of spasticity. If properly interpreted we say that all motor units are normal on voluntary activity in upper motor neuron disease, and if spasticity is present it is a form of voluntary or uncontrolled activity. Hence the characteristic pattern on the electromyograph screen both by sound and the oscillograph is that of a normal motor unit. The unusual groupings that occur in this type of abnormality are open to much discussion as well as disagreement, and the significance of observations is not included here.

CLINICAL APPLICATION

Three small needle electrodes are used: an active, reference, and ground contact electrode. A coaxial needle electrode can also be used, reducing total needles to two insertions. A Marinacci cable eliminates the necessity of skin electrodes, and permits rapid multiple samplings of the muscle. Intelligent understanding of neuroanatomy is a prime requisite. Proper relaxation of the part is paramount in eliminating any of the artifacts.

Table 1 shown, furnishes an outline of all neuromuscular conditions in an electromyographic characteristic, and makes it rather easy to have a working pattern which will permit information relative to the neurologic condition under consideration.

MUSCLE ATROPHY

Muscle wasting, weakness and paralysis are present in four major groups:

1. Disuse atrophy
2. Upper motor neuron lesions
3. Denervation atrophy
4. Primary muscle atrophy

Differential diagnosis in these groups on the basis of clinical manifestations alone is often difficult and even impossible.¹⁻⁸ Because of the similarity of clinical pictures in



Kassler Studios

FIG. 1. Electromyograph.

neuromusculoskeletal disease, diagnosis becomes confusing because the basic findings are muscular weakness and atrophy. Each group evidences a distinct electromyogram; hence electromyography can be used as an adjunct in distinguishing these several pathologic states.

*Disuse Atrophy.*³ Disuse atrophy is due to a restriction or a lack of use of the associated muscle groups. It may be associated with the following factors:

- a. Mechanical devices such as casts, splints and prostheses.
- b. Joint disease such as arthritis, fracture, bone infection and tumor.
- c. Psychological situations such as hysteria, malingering.
- d. Habit pattern such as habitually favoring of the limb.

TABLE 1
NEUROMUSCULAR CONDITIONS AND THEIR ELECTROMYOGRAPHIC CHARACTERISTICS

| Type of Atrophy | Needle Insertion | Voluntary Activity | Rest | |
|----------------------------|--|--|--|---------|
| Disuse | Neg. nerve fiber activity activity not prolonged | Normal motor units | Electrical | silence |
| Upper Motor Neuron Disease | Activate showers of normal motor units | Reduced in number or frequency but normal | Electrical silence if kept at rest | |
| Denervation Atrophy | Denervation fibrillation consisting of: mechanical, spontaneous and positive sharp waves | Nascent, polyphasic, giant | Denervation fibrillation | |
| Primary Atrophy | Negative nerve fiber activity not prolonged except in myotonia which produces "dive-bomber" effect | Dystrophic pattern may have myotonic pattern | Electrical silence, occasional denervation if fibrotic | |

Electromyographic characteristics are non-prolonged in insertion activity, negative nerve fiber activity on needle insertion, normal motor unit on voluntary activity, and electrical silence at rest.

Case 1. This patient had a history of a penetrating wound in the right popliteal area. He wore an immobilizing cast and subsequently underwent surgical correction. Following this he wore another cast for an additional two months. Then he showed a generalized atrophy involving all the muscles below the knee joint. During his visit to the clinic his major complaint was pain in the right calf. He was found to have contracture of the gastrocnemius soleus muscle and a shortened Achilles tendon resulting in approximately 15 degrees varus position of the right foot. His range of motion of the ankle was markedly reduced in all directions. He had hypesthesia, a non-palpable posterior tibial and dorsal pedis artery, and an absent deep tendon reflex. Oscillometric examination revealed approximately $\frac{3}{4}$ to one unit of pulsation at the level of the right ankle. Electromyographic examination was carried out for the entire right lower extremity. In the posterior primary divisions involving the neural segments from the L-2 to S-2, there were all normal motor units on voluntary

activity. There were no abnormal motor unit patterns, and electrical silence. Examination of the femoral and obturator nerves was normal. However, there were giant motor units present in the lower third of the right quadriceps indicating muscular hypertrophy. There was also an occasional denervation fibrillation in the gastrocnemius and the anterior tibial muscle. These findings were significant in that they indicated neuronal damage of a mild type associated with ischemia.

Since the electromyogram indicated no nerve damage involving the tibial and peroneal components of the sciatic nerve, the inference was that the difficulty was due to the ankylosis and disuse atrophy associated with the injury to the popliteal artery but not to any of the nerves in the area. He was treated accordingly from the standpoint of mobilization, stretching, and additional physical therapy procedures, and made a remarkable improvement. Hence the value of the electromyogram in disuse atrophy indicates the therapeutic approach to the problem as well as the saving of considerable time and effort in attempting to treat the patient as a neurological problem.

Case 2. This patient had a history of a shrapnel wound involving the left peroneal nerve. He had been injured in action ap-

proximately eleven years before. He was wearing a short-leg double bar upright brace, and had a disability rating of 50 percent. Electromyographic examination was carried out in detail involving the obturator and femoral nerves, the superior and inferior gluteal nerves, tibial and peroneal components of the sciatic. There were normal motor units of voluntary activity in the anterior tibial, gastroc-soleus and peronei muscles.

There was no evidence of any denervation fibrillation at rest. There were no polyphasic units present on voluntary activity. The normal function was demonstrated to the patient while he listened and saw the component on the oscilloscope. The electromyograph was then used a few times to demonstrate to the patient that he had good function in the involved muscle; and he was then treated in the Physical Medicine and Rehabilitation Clinic. Rehabilitation procedures resulted in good muscle function of the lower extremity. The brace was removed and he was allowed to return to work. As a result of these findings and his cooperation, a disability rating was eliminated.

Hence, the electromyogram is an exceedingly useful instrument in objective testing of nerve injury. It also serves the purpose of muscle re-education where "alienation" has occurred.

Case 3. This patient dropped a spool of wire on his back approximately twelve years ago and he stated that he received a "cracked vertebrae." He had suffered continuously over the following years and had been on partial disability compensation. He has had much difficulty in holding jobs because of his backaches, and frequent absences due to them. Examination revealed a severe back muscle spasm with less than 10 degrees of flexion in the upright position. The straight leg raising ability on the right was markedly restricted. The deep tendon reflexes in the right lower extremity were entirely normal. The electromyograph examination revealed no evidence of any denervation fibrillation of the neural segments from lumbar 2 to sacral

2 in this area. All voluntary normal motor unit of activity was present. The inference from the electromyographic examination was no root compression, root irritation or peripheral motor neuritis present in this area. This was pointed out to the patient visually as well as by the sound he produced on his voluntary contractions on the oscilloscope. As a result of this demonstration of muscle activity by electromyography he began to improve rapidly with physical therapy. Although a cure was impossible because of the long degree of disability and shortening of the muscles of the erector spinae group, the patient had been considerably relieved of his back problem.

The inference of this examination is that a long degree of hospitalization and treatment had been eliminated, a myelographic examination had been sidetracked, and possible exploratory surgery had been eliminated.

*Upper Motor Neurone Lesions.*⁴ In upper motor neural lesions with spasticity, tremor or rigidity, needle insertion activates showers of normal motor units. On voluntary activity, the normal motor unit may be reduced in number or frequency only. Electrical silence ensues if the area can be placed at total rest. However, the electromyograph can neither substantiate nor eliminate upper motor neural lesions from this technical concept.

Case 4. This patient had skull trauma with a skull fracture from a gunshot wound, and developed subsequent paralysis of the right upper extremity. He was thought to have a brachial plexus injury. The arm was placed in an airplane splint, and he received a considerable amount of physical therapy. Continued complaints of headaches and muscle weakness failed to show any response in management by conservative procedures. The electromyogram showed normal complexes in the fifth cervical segment to the first thoracic neural segment on the right. The electroencephalogram showed characteristics of the left subdural hematoma. On checking with the patient it was found that the history had been given erroneously and correspondingly

misinterpreted. The electromyogram thus indicated no evidence of any break or injury, and further neurological examination indicated subdural hematoma. The patient was operated on and made an uneventful recovery. Function was re-established in the right upper extremity within a matter of a few days.⁵

Denervation Atrophy. In denervation atrophy, the neurologic defect is in the anterior horn cell, in the cervical or lumbar motor nerve root, in the plexus or in the peripheral motor nerve. On needle insertion there is denervation activity consisting of positive sharp waves, mechanical fibrillation and spontaneous fibrillation. When regeneration begins, nascent motor units appear on voluntary activity. Polyphasic units, finally normal motor units, appear as regeneration progresses. There may be an appearance of giant motor units which compensate for the atrophy of disuse, and represent hypertrophied muscle fibers. The distribution of the denervated activity is important in localizing various lesions that occur in this type of peripheral nerve involvement.⁵

Case 5. This patient gave a history of having a back injury associated with obstacle course training approximately twelve years ago. In the subsequent period he had recurring back pains which radiated down his right lower extremity. In 1951 a myelogram was reported as normal. Examination at the Regional Office here in the Physical Medicine and Rehabilitation Unit revealed normal sensory and motor components with physiologic deep tendon reflexes. The electromyogram study which was carried out revealed denervation fibrillation and polyphasic motor units in the right anterior tibial muscle (deep peroneal nerve), indicating motor root pathology in the level of L-5. The patient on the basis of these findings was referred to the Veterans Administration Hospital, and a fourth lumbar disc was found on the fifth lumbar motor root on the right. The laminectomy completely relieved the patient and it was shown that he had erroneously refused compensation over the twelve year period,

because he did not believe that he had a herniated nucleus pulposus.

Hence in this case, the electromyogram was a very useful instrument which not only supplemented but it replaced the erroneous findings of the myelogram. It has been our experience that approximately 90 percent of the patients with root compression, are accurately diagnosed by the electromyogram, and only approximately 70 to 80 percent by myelography. Therefore, the electromyogram should be used for all patients who have back complaints with radiating pain into the lower extremities. This becomes a rather inexpensive procedure to determine the possibilities of root compression. Compared to myelography, the advantages are obvious.

Case 6. This patient has a history of symptoms dating back to 1944 at which time he was completely disabled for four months. He had a history of radiating pain into his right lower extremity and a considerable amount of muscle spasm which reduced the ability to raise his right leg in an extended position. This positive straight leg raising had been present for the entire duration of the patient's disability. The deep tendon reflexes were present and normal. Sensory changes were noted on the lateral aspect of the right leg and dorsum of the right foot, corresponding to an L-5 neural segment distribution. Electromyographic examination revealed evidence of root irritation in the S-1 neural segment on the right. The patient was hospitalized and a myelogram was done which showed filling defect at the level of the L₅ S₁ disc. Surgery was carried out a short time later and revealed a large herniated nucleus pulposus at this level. The laminectomy was successful and the patient was completely relieved.

In this instance the electromyogram again proved that it can be used as an exploratory diagnostic instrument in determining positive root compression. In this manner the patient had been saved a considerable amount of possible permanent damage, was hospitalized on the basis of an electromyographic examination, exploratory laminectomy was

performed, and the patient was cured.

Case 7. This patient was injured fourteen years previous to the examination at the Veterans Administration Regional Office. He had a history of being struck in the upper third of the left leg. During this period of time he had variable pain and discomfort and when he was seen at this office he was wearing a brace to counteract a left foot drop. Examination revealed atrophy of the thigh and leg area, quadriceps weakness of all of the ankle joint muscles, gastrocnemius and anterior tibial involvement but none of the knee joint muscles such as the hamstrings and the quadriceps. There was an absence of the deep tendon reflexes at the Achilles area. The arterial pulsations at the dorsalis pedis and posterior tibial arteries, the popliteal femoral arteries were normal. Impression up to this time was that of a sciatic nerve lesion involving the tibial and peroneal component.

Electromyographic studies revealed normal motor units, some slight denervation fibrillation of the tibial component, and marked denervation fibrillation in the peroneal component. This occurred directly above the level of the deep peroneal nerve. A diagnosis of scar neuroma of the peroneal nerve was made. The neurological consultation agreed with the findings of a scar neuroma. A myelogram which was carried out because of the suspected root compression was entirely normal.

Hence the electromyogram indicated that regular physical medicine and rehabilitation procedures should be carried out with reference to the peroneal palsy nerve. The neuro-surgical consultant did not feel that surgery offered any possibility in the term of neurolysis or similar neurosurgical procedure. Subsequent physical therapy provided considerable improvement in this patient's functional activity.

Case 8. This patient had a history of falling on a piece of glass in February of 1955 and cutting the ulnar nerve in the right wrist. He lost all sensation in the fourth and fifth fingers in terms of his interossei mus-

cles. Mobility of flexion of the distal phalangeal joints, ulnar wrist flexion, abduction of the fingers were considerably reduced. There was associated weakness of flexion of the proximal phalangeal joint and metatarsal phalangeal joint. He received physical therapy at one of the military installations for a period of three months—this consisted of paraffin baths, faradic and galvanic stimulation and muscle re-education without any improvement. He was then given a medical discharge with a partial disability rating on the basis of ulnar nerve injury. An electromyographic examination revealed the presence of nascent motor units in the muscles of the hypotenar eminence, flexor carpi and extensor carpi ulnaris and interossei muscles. The inference from this finding was that there was incomplete innervation and that nerve regeneration was apparently taking place. These findings definitely indicated that the patient would benefit from a re-establishment of physical therapy procedures. Consequently he was placed on a program of whirlpool, active exercise, electrical stimulation and muscle re-education. In subsequent findings he completely regained his lost sensation, and improved considerably in his ability to flex his digital phalanges (involving the fourth and fifth digits). The ulnar wrist flexion and abduction power appeared to be completely recovered. The other associated functions were also returning rapidly.

The point to be gained from this case is that the electromyographic examination revealed the presence of returning innervation of muscles in the ulnar distribution of the nerve after four months lapse of treatment. The inception of physical therapy on the basis of the electromyographic report resulted in a good rehabilitation of a disabled right wrist and knee.

Distribution of denervation activity can be localized in the various lesions. When anterior horn cells^a are involved there may be a spotty segmental pattern which is characteristic of poliomyelitis, or a diffuse pattern which is characteristic of spinal muscular

atrophy or an early amyotrophic lateral sclerosis. In the latter, the denervation is present in the lower extremity early despite the pyramidal tract signs clinically.

In the cervical and lumbar area, when the denervated activity is confined to one neural segment or myotome, involvement is almost always due to herniated nucleus pulposus. When more than one root is involved, the denervation activity is generally bilateral and has a characteristic of an extradural tumor.

In neuronitis, denervation activity is manifested in the greatest degree in the periphery of the extremity. This is basically due to the fact that the long axons are the most seriously affected. In the early stages of development, the clinical findings in the spinal fluid are of considerable help, but in the later period much confusion and error might result.

Plexitis, which is most commonly due to serious trauma or toxic effect, occurs in the distribution of the corresponding segment affecting the component part. The denervation activity does not follow a segmental pattern and is more distal in distribution.

In polyneuropathy, the denervated activity is in the peripheral distribution and usually affects the muscles of the extremities.

In mononeuropathy, the denervated activity is confined to the muscles supplied by a given nerve. This condition may be due to pressure, stretching or similar trauma.

In peripheral nerve injury, the distribution of the denervation activity is determined by the individual nerve or plexus primarily affected. The EMG can determine the presence of the lesion, whether it is partial or complete. If partial, it can determine the degree of involvement and whether it is severe, moderate or slight. The denervated activity is proportional to the severity of the nerve lesion. In a complete lesion there is only denervation activity, while in the partial lesion, the combination of denervation activity, polyphasic units, and normal motor units, determine the severity. The status of nerve regeneration can be noted after end to end suture, crushing or compression, long

before recovery is clinically obtained. Localization of the lesion in the cord, root, plexus, or peripheral nerves is possible with the use of electromyography.

Cranial nerves, as in the seventh nerve involvement, show a distribution pattern of denervation in three component nerve branches. When there is only denervation in complete paralysis, the prognosis is poor and other more radical measures should be utilized. If voluntary motor units are also present, varying degrees of recovery can be expected. Cervical cord lesions have no facial component and can be differentiated electromyographically. In central lesions of the motor cortex there is no denervation activity in the facial muscle.

Primary Muscle Atrophy. A primary muscle atrophy is due to a disturbance within the muscle itself, and the motor components are intact. Muscular dystrophy shows a typical pattern of normal motor units, which are many but small in size. All types of dystrophy whether they be atrophic or pseudo-hypertrophic, distal, proximal, diffuse or restricted in distribution, show a typical electromyographic pattern with no denervation activity except at times when there is a minimal amount associated with marked fibrosis.

DISCUSSION

The physiatrist, when experienced in electromyographic procedures, can facilitate diagnosis, prognosis, and logical therapy in neuromusculoskeletal diseases. It is obvious that the electromyograph is an instrument of considerable high fidelity, accuracy and electronic uniformity. The saving to the patient in terms of disability, promoting rapidity of diagnosis, elimination of controversial clinical findings, is considerable.

ASPECTS OF INTERPRETATION

1. *Denervation* always occurs 18 to 21 days after insult. Hence, any examination before this time may result in an erroneous interpretation.

2. In *root compression* lesions, the posterior and the anterior primary divisions will

show denervation. If only the anterior areas show denervation, then root compression is not present.

3. *Multiple needle insertions* are necessary to determine completely the distribution of denervation.

4. *Multiple neurologic diseases* may be present. It is not uncommon to find poliomyelitis, with its denervation fibrillation, in a child with muscular dystrophy (only dystrophic patterns). Thorough sampling and proper history taking can explain such a picture.

5. *Bizarre patterns and artefacts* are not uncommon. Lack of experience in electromyography and inadequate knowledge of neuroanatomy may result in incorrect interpretation.

CONCLUSION

Electromyographic study can aid a properly conducted medical and neurological examination. Traumatic lesions of the spinal cord, roots, nerves and plexuses, and non-traumatic disease such as degenerative and infectious syndromes, and toxic conditions produce muscular weakness, atrophy and paralysis. When all are present, the resultant abnormal states make it difficult to differentiate the clinical entities. Denervated activity is produced with specific anatomic distribution. The findings of the normal motor unit, the polyphasic and nascent motor unit on voluntary activity, denervation fibrillation at

rest, and electrical silence in normal or fibrotic muscle make for a simple concept in clinical diagnosis by means of electromyography. Electromyography is basically a laboratory procedure the results of which must be carefully correlated with clinical findings.

16861 Wyoming Ave.
Detroit 21, Mich.

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SUPPORT THE RED CROSS

The Air Force and the Application of Computers to Medicine and Biology

By

CAPTAIN HARRY WEINRAUCH, USAF (MC)* AND EVAN PATTISHALL, PH.D.†

(With one illustration)

COMPUTERS have been widely employed in commerce and industry, and are finding increasing application in the physical sciences. They are presently being employed for such diverse functions as weather forecasting, designing aircraft, guiding missiles, translating languages, regulating production, stowing records, and the integrating of the radar defense system. However, it was not until World War II, when military considerations stimulated technological progress, that most of these great advances in computer art were made possible.

With the advent of the jet and missile age, the Air Force has directed considerable effort toward the advancement of computer capability in order to predict the relation between design and performance of aircraft, without the actual construction of prototype models. In this manner, the effectiveness of weapon systems is improved even at the drawing board stage, with a tremendous savings in funds and manpower.

The almost limitless horizon for the scientific use of computers arises from the fact that even the most complex mathematical logic can be reduced to a series of simple arithmetical calculations. This transformation permits the application of the unique features of a computer to the solution of complex problems in the sciences. These unique features include its ability to perform amazing numbers of arithmetical procedures in a phenomenally short time, and its capability to store and recall immense amounts of data. In addition, modern com-

puters have attained a state of maturity and versatility which enable them to solve any problem in logic which can be stated in symbolic mathematical terms, and to solve the problem in a small fraction of the time which would be necessary by hand computational or desk calculator methods.

This paper reports the first organized attempt to explore the applicability of computers to medicine and biology. The increasing use of mathematical concepts and procedures, such as curve fitting, probability theory, advanced statistics, and model construction in biology and medicine has demonstrated the actual need for these sciences to handle masses of data and higher mathematical techniques in a rapid fashion. The simultaneous arrival of the biological sciences and of computer technology at their present high levels of scientific capability presents both disciplines an opportunity to combine their techniques in a systematic search for solutions to problems which have not yielded to traditional methods.

The Air Force's Air Research and Development Command, and its predecessor agencies, have been to a considerable extent responsible for advancing computer capability to its present high level. It has developed both small-scale computers for in-flight use, which aid in such tasks as navigation and bombing; and large-scale devices, such as the SAGE (Semi-Automatic Ground Environment) computer, which coordinates the aircraft warning system. This Command, aware of its responsibility to acquaint the civilian scientific community with information developed for military purposes which can contribute to the general body of scientific knowledge, has had a leading role in encouraging the applications of computer techniques to medicine and biology. As an initial step, the Air Research and Develop-

* Chief, Aviation Medicine Branch, Directorate of Human Factors, Air Research and Development Command, Baltimore, Maryland. Present address: 215 W. 88th St., New York 24, N.Y.

† Director, Division of Educational Research, University of Virginia, Charlottesville, Va.

ment Command sponsored a series of regional conferences between outstanding representatives from the fields of computer technology, and the medical sciences, for the purpose of acquainting them with each other, and for exploring the applications of modern automatic data processing devices to medicine and biology. These conferences were held in Baltimore, Cambridge, Chicago, and Los Angeles.

The conferees generally agreed that computer techniques would be increasingly employed in both the medical and biological sciences. The conferences also disclosed that these techniques were already being applied to a limited degree. Dr. Rufus Hessberg, of the Aero Medical Laboratory at the Wright Air Development Center, has constructed an automatic EEG analyzer (Fig. 1), which has considerably reduced the time required for the analysis of the wave patterns. The electroencephalogram is a wave pattern whose amplitude and frequency are already electrical quantities; hence the conversion of these to numbers which can be automatically analyzed is a readily feasible procedure. Similarly, it was suggested that the analysis of any of the bioelectrical phenomena, such as the electroretinogram, the electrocardiogram, the electromyogram, the cochlear microphonics, the galvanic skin responses, and the unicellular potentials, both

for clinical and research applications, could all be performed by specialized automatic devices.

Dr. John Womersley, of the Aeronautical Research Laboratory, also at the Wright Air Development Center, has evolved a model of the hemo-dynamic forces present in the larger arteries which he described at the Air Force conference in Chicago. The mathematical problem is that of the relation between the oscillatory properties of an elastic container and a liquid of uniform viscosity which is propelled by an intermittently applied force against a fairly constant resistance. The relation of these forces can be described by a formula, the validity of which has to be checked by varying the functions with respect to each other to determine the full range of variability and by correlating these with a few experimental observations. Dr. Womersley, in order to integrate these variables into a mathematical formula which could be employed as a physiological model, depended to a great extent on computers.

The above example suggests two important areas of computer application. One is the obvious speeding up of involved mathematical calculations, which may be inherent to a particular biological problem. The other is the construction of special circuitry which will cause the electrical functions to vary with respect to each other in the same mathematical relationship as the biological functions. In this manner, simulation of a biological system by an electrical system is achieved. We see then, that by means of mathematical formulations, biological processes, whether on a molecular, cellular, organ system, or total organism level, can be duplicated in the same way that physical flight characteristics of an aircraft are simulated by computers.

Other possible applications for computers which have been noted in the popular scientific and lay press came in for some discussion at these conferences. One of these was the intriguing notion of using the computers ability, when primed with the proper cues in advance, to make a series of logical choices in the complicated process of elimi-



U. S. Air Force Photo

FIG. 1. EEG Analyzer.

nation to which, in theory at least, the activities involved in making a differential diagnosis might be reduced. The account of the French ophthalmologist, Dr. Francois Paycha, who described in the summer of 1956 the invention of a specialized computer for the diagnosis of diseases of the eye, was reviewed at several of the regional meetings. Carl Berkley, of the Dumont Laboratories, discussed the theoretical characteristics and the logical circuitry which would be necessary in a computer capable of carrying out the differential diagnostic steps necessary in the identification of hematological disorders at the Chicago Conference.

The consensus of the conferees seemed to be that, while such computers would offer attractive advantages in their ability to "bear in mind" a much larger number of critical bits of evidence than the human diagnostician is able to, the art of diagnosis is still sufficiently inexact and intuitive that it is infeasible to express the procedure in precise logical steps.

An application of rapid data handling machinery which appeared somewhat nearer at hand to the Air Force's scientific guests was the process of storing, yet keeping accessible, the large quantities of clinical and laboratory information which is accumulated at all hospitals. Even after a relatively short time, the data collected during the course of routine patient care becomes so massive that the problem of locating, pulling out, and coordinating any given set of required facts becomes almost insoluble. Modern data processing devices, on the other hand, with their high speed reaction time and infallible memory, can pull out any properly and distinctively coded single item or category of items occurring in the hospital's entire experience in less time than is usually required to find one complete case history.

With the increasing interest in the use of quantitative methods and mathematical operations in medicine and biology, other organizations, such as the National Institutes of Health, and the Institute of Radio Engineers have also recently sponsored meetings between representatives of the medical sciences and computer technology.

Similar in scope to the Air Force conferences, but somewhat more formal, these meetings have served both to acquaint prominent authorities with the potentialities of computers in medicine, and to overcome the barriers of language and viewpoint which exist between the two disciplines.

As a direct sequel to the Air Research and Development conferences, the National Academy of Sciences—National Research Council, acting in concert with the Rockefeller Institute for Medical Research, and with Air Force support, are appointing an *ad hoc* committee to consider the applications of computers to medicine and biology. This committee will review the principles and practices of computer techniques, analyze the types of medical and biological problems in which they have been employed, and recommend the types of problems to which they could profitably be applied. They will also survey the institutions in which such work could be performed, and recommend the measures necessary to facilitate the adaptation of computers to medicine and biology. The committee's report will not only familiarize biologists and medical scientists with the capabilities and potentialities of computers, but also will alert these scientists to the possible applications of these new tools in their own fields of endeavor.

The Air Force recognizes that the committee's findings will have a significance which extends far beyond its own direct interests and sphere of responsibility. It has realized, however, that the developments brought to fruition for its own purposes belong in reality to the nation, and must be made available to those who can use them. It is intriguing indeed to reflect on the fact that the immense amount of funds being spent for the attainment of a defensive capability should in the final analysis also earn dividends for the medical and biological sciences.

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A Thesis on the Art of Military Preventive Medicine

By

MAJOR V. HARRY ADDOUNIE, USAF (MSC)*

THE mission of the Medical Service in the United States Air Force is the "—conservation of man-power—the preservation of the strength of the military forces. This is accomplished by the selection and enrollment for military service, through properly conducted physical examinations, of only those men physically fit for the performance of the duties to devolve upon them, by keeping such personnel in good physical condition through application of modern principles of *preventive medicine*, and in furnishing those who do become disabled with such aid in the form of evacuation and hospitalization facilities as will speedily restore them to health and fighting efficiency." Notice the words by keeping such personnel in good physical condition through the application of modern principles of preventive medicine.

This paper will not deal with specifics. I only hope to inculcate the reader with the importance of preventive medicine measures. Only through the combined efforts of the Medical Service and non-medical components of the USAF can disease be held in check in the USAF. The job is too great for a few, but is comparatively simple for the many. The principles which are known must be practiced by all. We look to the commanders to carry out the measures for controlling disease, and in turn, to pass the principles to their subordinates; it is expected commanders will come to the Medical Service for technical advice.

A health officer's position in the community, civilian or military, is a difficult one. He is wanted at the time of an epidemic but is spurned and scorned while the community is thriving in the presence of

filth and insanitary practices. The danger of an epidemic exists when sound health practices are ignored. In civilian life the politician is frequently a stumbling block to good sanitation; in military life the non-health conscious commander can be a thorn in the side of the health officer. A thriving business or unit can be a health menace.

It appears to be a primitive trait to tolerate poor sanitation and be a part of it. Witness the debris at the wayside camp of the tourist, at the beaches, and along our highways. Actually how far have we progressed from some of our primitive traits? Do we want health or do we want to take a chance with disease? Surely there is still plenty of opportunity to contract disease even in the face of good preventive medicine measures. We cannot and will not deny this. For example: the statement of a layman who had much contact with a prominent medical group of a large city stated, "In my contact with these medical men I have been amazed at the amount they know, but on the other hand, I have been amazed at what they don't know." There is certainly much known about the prevention of disease, and yet there is much we don't know. We must all use to the maximum those measures that are known to prevent disease.

The value of sanitary principles is age old. Recall one of the Mosaic laws as recorded in Deuteronomy, Chapter 23, verses 12 and 13: "Thou shalt have a place also without the camp, whither thou shalt go forth abroad: (13)—and thou shalt have a paddle upon the weapon; and it shall be, when thou wilt ease thyself abroad, thou shalt dig therewith, and shalt turn back and cover that which cometh from thee." The need for sanitation was recognized in the days of the Israelites.

The Romans brought a good water supply to their cities by systems of aqueducts. Pre-

* Executive Officer, Preventive Medicine Division, Directorate of Professional Services, Office of the Surgeon General, U. S. Air Force, Washington, D.C.

ventive medicine now stresses a safe supply of water in adequate amounts. Some of the horrible cholera epidemics would have been prevented had some simple measures been known and taken to supply potable water.

Preventive medicine measures depend on etiology of disease. This word "etiology" is a much used one by the medical man. All it means is the cause of disease, how it spreads. "Ology" of course, means "study." So we arrive at the study of the cause—sometimes a very involved study; and in many diseases, by no means as yet a complete study, e.g., infantile paralysis, cancer, arteriosclerosis. But great strides have been filled with great advances in combating diseases, because of increased knowledge of their cause. The education of the public and their acceptance of the principles and measures of public health have certainly not kept up with what is known. Superstition has by no means been overcome; fear still exists; indifference is ever present; downright obstinacy even among educated people prevails. There is a continued need for education along preventive medicine lines—and I am sorry to say right in our own medical circles.

I now would like to point out some of the problems that have faced the military since the birth of this nation. First among these was smallpox. During the American Revolution, smallpox vaccination was accomplished by passing the material from pustules of the actual cases of smallpox to the well individual. So dreaded was this disease that individuals were willing to undergo this procedure and develop a case of actual smallpox, though usually in a light form. These were days in which strong drugs were used and believed in, yet, here is one example of preventive medicine, a rather crude but effective measure. This crude measure, had it been properly applied, might have won for us all of Canada. In the fall of 1775, Benedict Arnold, with approximately 1,100 men, pushed through the main wilderness of Quebec; after great difficulty, he finally arrived in Quebec on May 1. Reinforcements from Massachusetts and New Hampshire had

joined him, and the Army now numbered 1,900. But what happened—900 of them took sick, chiefly with smallpox. It was said that only 500 men could be counted on to carry out the plans of attack. Smallpox continued; men vaccinated themselves until an order was issued to put an end to the practice (later proved to be an unwise order). The British received reinforcements, and great disorder prevailed among the Americans; General Thomas ordered Dr. Senter to go to Montreal and prepare a hospital for the reception of smallpox patients and for the inoculation of soldiers. A Congressional Commission, headed by Franklin, was investigating the failure of the expedition. Arnold wrote to the Commission as follows: "I should be glad to know your sentiments in regard to inoculation as early as possible. Will it not be best, considering the impossibility of preventing the spreading of smallpox, to inoculate five hundred or a thousand men immediately, and send them to Montreal, and as many more every five days, until the whole received it; which will prevent our Army being distressed thereafter; and I make no doubt that we will have more effective men in four weeks." The Commission agreed. Dr. Senter later wrote: "I generally inoculated a regiment as a class who had it so favorably as to be able to do garrison duty the whole time." General Thomas caught the smallpox and died; General Thompson then assumed command. He wrote to the Commission: "On ordering the surgeons to examine the state of the sick, many have been found at the point of death, who were left by their officers without a person to take care of them. I also found upwards of a hundred damned rascals, crowded among them, fit for duty."

How wonderful it would have been if they had our present smallpox vaccine, a vast improvement upon Jenner's great discovery of 1796. Even now some people have neglected to use the discovery and we had a smallpox epidemic in New York a few years ago. Will we insist that every man in our units be immunized against smallpox or will

we let 10% get by? That will be up to us as we progress in our service careers, whether it be smallpox vaccination or any other preventive medicine measure.

The widespread and malignant dysenteries which attended armies of those days, and for a hundred years later are difficult to understand today. Dysentery was common in the Army during the American Revolution and a similar dysentery was present among our troops in the Philippines in 1899-1901. The dysentery we had in World War I and World War II was of a much milder sort. The principles involved in the spread of dysentery were the same, however, as existed for hundreds of years.

Dr. Tilton writing of dysentery during the American Revolution, stated: "The putrid diarrhea was generally the result of dregs of other camp and hospital diseases; and was the most intractable disorder of any we had to deal with."

Again we meet the problem of diarrhea and dysentery in the War of 1812. Dr. Lovell makes these remarks in his report of 1817: "Bad food and bad weather might cause diarrhea, dysentery and other disorders; however, this alone does not necessarily or even generally produce such complaints, and did not do so during the war." He considered the cause to be undue exposure to cold and moisture. In order to meet this danger, he recommended that soldiers be required to wear a woolen shirt and to follow the advice of Dr. Franklin in not taking it off until midsummer and putting it on again the next winter. (The woolen shirt idea apparently gained some favor—but did not do away with dysentery.) He more nearly hit the nail on the head when he mentioned bad food and bad water. But these were the days before bacteriology, and to think of bacteria in 1817 was as bold as to think of the atomic bomb in 1919.

The soldiers of the 19th Century suffered greatly from dysentery. It was found in alarming numbers during the Spanish American War. Typhoid fever was prevalent; more than 90% of the volunteer regi-

ments in the Spanish American War developed typhoid fever within eight weeks after going into camp. Eighty-six of the 106 regiments developed typhoid fever within three weeks after reaching national encampments. Many medical men attributed outbreaks of typhoid fever to food—but it was always attributed to "tainted meat," "stale pies," "unripe" or "over-ripe fruit," "soft drinks"—never to food contaminated by the cook or kitchen police. We know now that typhoid fever and the dysenteries come from contaminated food and liquids—contaminated from the latrine. Sternberg, the Surgeon General of the Army at the time of the Spanish-American War, must have had an inkling of the cause; he published his Circular Letter No. 1, 29 April 1898, wherein the following recommendations were made:

"When practicable, camps should be established on high and well drained ground not having been previously occupied.

"Sinks should be dug before a camp is occupied, or as soon after as practicable.

"The surface of fecal matter should be covered with fresh earth or quicklime or ashes three times a day.

"New sinks should be dug and the old ones filled when the contents of the old ones are two feet from the surface of the ground.

"Every man should be punished who fails to make use of the sinks.

"All kitchen refuse should be promptly buried and perfect sanitary police maintained.

"Troops should drink only boiled or filtered water, coffee or tea (hot, not cold), except when spring water can be obtained which is pronounced to be wholesome by a medical officer.

"Every case of fever should receive prompt attention. If albumin is found in the urine of a patient with fever, it should be considered suspicious (of yellow fever) and he should be placed in an isolated tent. The discharge of patients with fever should always be disinfected at once with a solution of carbolic acid (5 per cent), or of chloride of lime (6 ounces to the gallon of water),

or with milk of lime made from fresh quicklime.

"Whenever a case of yellow fever occurs in camp, the troops should be promptly moved to a fresh camping ground located a mile or more from the infected camp.

"No doubt typhoid fever, camp diarrhea, and probably yellow fever are frequently communicated to soldiers in camp through the agency of flies, which swarm about fecal matter and filth of all kinds deposited upon the ground or in shallow pits, and directly convey infectious material, attached to their feet or contained in their excreta, to the food which is exposed, while being prepared at the company kitchens or while being served in the mess tent. It is for this reason that a strict sanitary police is so important. Also, because the water supply may be contaminated in the same way, or by the surface drainage.

"If it can be avoided, marches should not be made in the hottest part of the day—from 10:00 to 5:00 p.m.

"When called upon for duty at night or early in the morning, a cup of hot coffee should be taken. It is unsafe to eat heartily or drink freely when greatly fatigued or overheated.

"Ripe fruit may be eaten in moderation, but green or overripe fruit will give rise to bowel complaints. Food should be thoroughly cooked and free from fermentation or putrefactive changes.

"In decidedly malarious localities, from 3 to 5 grains of quinine may be taken in the early morning as a prophylactic, but the taking of quinine as a routine practice should only be recommended under exceptional circumstances.

"Light woolen underclothing should be worn, and when a soldier's clothing or bedding becomes damp from exposure to rain or heavy dews, the first opportunity should be taken to dry it in the sun or by the fires."

His instructions were ignored, typhoid fever and the dysenteries spread rapidly through the camps. Flies produced more deaths and illness than the Spaniards ever

could account for. But who got the blame? Poor Sternberg. It was a convenient place to hang the blame; this fact should be impressed upon our minds indelibly for the reason behind it is constantly with us. Congress appropriated \$50,000,000 to fight the Spanish-American War, but only \$20,000 of it was for the Medical Department. Sternberg certainly should not have been blamed. The principles of sanitation that he laid down were not followed, too little money was allowed for such an important matter as health—this is still true today.

Let us learn one thing from this and indoctrinate our kitchen personnel thoroughly with this idea: "Wash the hands immediately after visiting the toilet." And let every food service supervisor see that there are signs posted in the latrine, and, to insure that there is soap, a hand brush, and towels available. Keep the place clean.

Venereal disease—forever with us. The Eves of the Ages have passed on rotten apples to the Adams, the Joneses, and the Smiths. (Any similarity to names of the readers is purely coincidental.) Venereal disease was no respecter of the heroes of the American Revolution any more than the heroes of World War I, World War II, or the Korean War. This is evidenced by a Resolution of Congress, January 6, 1778: "Resolved, that the sum of ten dollars shall be paid by every officer, and the sum of four dollars by every soldier, who shall enter or be sent into any hospital to be cured of the venereal disease; which sums shall be deducted out of their pay, and an account thereof shall be transmitted by the physician or surgeon who shall have attended them, to the regimental paymaster for that purpose; the money so arising to be paid to the director general, or on his order, to be appropriated to purchasing blankets and shirts for the use of sick soldiers in the hospital."

Treatment of venereal disease has improved. The preventive measures are simple but the individual must carry them out. As yet, unit commanders, chaplains, and physi-

cians have been unable to make a deep enough mental impression on personnel that will not be filled in by alcohol. And as yet, we have not developed any "shot in the arm" method of preventing venereal disease 100%. It is the bane of the commander as well as of the Medical Service. The use of soap and water will tend to prevent the disease, but Father Time must not be permitted to turn the clock too far before they are used. Better yet, continence is 100% foolproof.

Yellow fever and malaria. These are considered together because of their similarity of transmission. Both are transmitted by the mosquito, although different families of them are involved. Malaria is a disease well known to the ancient Romans. It was called "ague" by the American colonists. Both yellow fever and malaria appeared in the Mexican War at Vera Cruz. Yellow fever and malaria appeared in the sick and wounded reports of the Spanish-American War. The mosquito was discovered to be the cause of malaria in 1897, and the cause of yellow fever in 1900. Headnets were ordered for the troops in 1898. The war on the mosquito had begun. After the discovery of the mosquito to be the cause of yellow fever transmission, the war on this insect was intensified. In spite of these discoveries, efforts toward the eradication of the mosquito were opposed when it came to building the Panama Canal. Gorgas was sent to Panama as health officer, and as all health officers he was unpopular because he had to change the usual way of life. He turned the place upside down; the United States was scoured and cleaned of pyrethrum for use in Panama. The campaign went on. The unpopular Gorgas rid the place of yellow fever, and with it the malaria incidence dropped. We know the result—the Panama Canal was built because men lived where before they had died.

The problem of malaria has not been so simple because of the difference in mosquito habitat and the chronicity of the disease. We approached World War II not fully realizing what malaria could do and not having all the weapons to fight it. Malaria

discipline was poor, and quickly became the World War II disease. Guadalcanal soon impressed us with the importance of this disease. The drive was on. Something had to be done and done quickly. Atabrine suppressive therapy, the use of the mosquito bar, spraying with all types of insecticides known to be effective was enforced. Then came the more effective repellents, the aerosol-pyrethrum bomb, then DDT. Finally, entire islands were sprayed from aircraft—sprayed before landings were made. All these measures reduced malaria, and the conquest of the Pacific was made easier.

Yellow fever during World War II did not give us so much concern except from the standpoint of immunization. After the experience with the jaundice resulting from the human serum type of vaccine, the method of preparation was changed, and is now prepared from a safer media. So another disease has been added to the list of those held in check.

The unique thing about preventive medicine in the Air Force today is the effect of the airplane, direct and indirect, on the health of Air Force personnel. Otherwise, practicing preventive medicine in the Air Force is not much different from the practice of preventive medicine in the other military agencies. However, the effect on health attributable to the airplane is of such significance and magnitude that the entire Air Force preventive medicine program is conditioned by it. The concept of global air deployment, in practice, has created many new preventive medicine problems. Some of these are: the effects of stresses placed on personnel from operating modern high performance aircraft; the effects on ground personnel from ground operation of aircraft; rapid movement of personnel into and out of hyperendemic areas of disease before permanent control measures are instituted; the rapid movement of personnel from hot to cold climates, or vice versa, with the accompanying psychological factors; the possible introduction of infected insect vectors from an endemic area of the world to a non-en-

demic area; and the effects on personnel from atomic, biological and chemical warfare. Medical science is finding most of the answers to these problems, but—to have a beneficial effect—all of us must adhere to and practice the principles of modern preventive medicine to defeat these new hazards to our health.

Speaking before the 1956 annual convention of the Association of Military Surgeons, the Chairman of the Joint Chiefs of Staff, Admiral Arthur W. Radford, USN, declared that the individual members of each Service "should be more expert in preventive medicine."

He said it is his feeling "that preventive medicine can no longer be limited to the problems of simply preventing the transmission of disease. Instead each individual must have an understanding of the personal preventive medicine of building his own physical strength, stamina, and resistance to disease.

"From where I sit as a member of the Joint Chiefs of Staff, I sometimes wonder about this aspect of our preventive medicine. I wonder if we are adequately stressing the appropriate principles of personal and individual health.

" . . . Does the individual officer in some key position of responsibility have a reasonable medical understanding of the 'why' in heart disease? Does he know how he might minimize some of the causes of this serious disability? And is he aware of the serious physical detriments involved in obesity?

"Then take our young military specialists—our jet pilots, submariners, guided missile experts, and the like—do you think that they

really understand the dynamic forces of nuclear power, supersonic speeds, toxic chemical fumes, electricity, and high altitudes? Do they know the different forces which can surge through their bodies, and what their different effects will be?"*

Much has been written and at great length about preventive medicine. Great strides have been made. But we must be sold on the principles of preventive medicine and in turn, sell our subordinates. Everyone must believe in preventive medicine measures and practice them, continuously. If we are to maintain air power capable of operation on a global basis we must maintain personnel as well as materiel and equipment in top condition. Only then can U. S. air power be capable of making immediate simultaneous air strikes from many different areas against any aggressor who attacks us.

We mention mental hygiene, orientation, information and education, and personal affairs consultation, but in the final analysis, it adds up to leadership, taking an interest in personnel by their leaders, in the hope that everyone will see more clearly his responsibility to himself and country. Only by bringing out some of the problems of the past can we hope to impress all personnel of their obligations and responsibilities. Preventive medicine costs money and effort but pays big dividends—the preservation of the strength of the USAF.

* Extracted from "Our Military Postures," speech of Admiral Arthur Radford, Chairman, Joint Chiefs of Staff, given at the International Luncheon, Association of Military Surgeons of the United States; November 13, 1956. See *MILITARY MEDICINE*, Vol. 120, pages 130-133, Feb., 1957.



VACCINATE NOW FOR POLIO

Cold Weather Survival

By

EDWIN WOOD, M.D.

(With two illustrations)

THE movement northward of both military and civilian population has brought about the need for equipment to enable man to endure the rigors of extreme temperature and wind.

Men who return immediately to shelter after completing heavy physical labor, may find that little protection is needed. However, men who perform less arduous tasks such as sentries, drivers, linesmen, and the like will not produce enough body heat to counteract the effects of wind chill.

The efficiency of individuals subjected to extremes of cold and wind is in direct ratio to their ability to withstand the factors involved.

A device has been perfected allowing longer exposures to extreme temperatures, regardless of wind velocity, which not only acts as a face mask but, by retaining the body heat, has overcome the crippling effects of extreme cold to the body (Figs. 1 and 2).

This device has been proven to increase man's efficiency in the cold and to endure that cold longer, thus allowing fewer numbers to perform more duties which can be a great factor in logistics.

The use of proper equipment tends to assure a sense of security that oftentimes is lacking under the trying and hazardous conditions that prevail in cold latitudes.

Nasal respiration has a very important function and its mechanism is of the utmost importance.

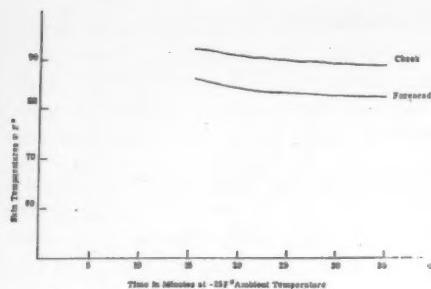
When air enters the nose, it moves along a parabolic curve between the superior mid-turbinate and septum walls so that the air is forced to pass the olfactory membrane enabling differentiation of odors. The cilia screens foreign bodies, and the nerve endings are protected. The air passes along the continuation of the curve into the nasal pharynx, the larynx, the bronchi, and lungs; hence, if the air is warm, the cilia is protected and the



FIG. 1. Face mask (front view).



FIG. 2. Face mask (side view).



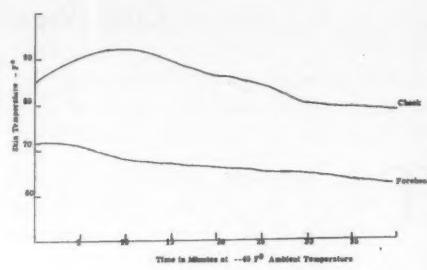
GRAPH 1.

pH of the mucosa is maintained.

When cold air is introduced, the picture changes radically, the turbinates are engorged, the motion of the cilia is arrested, and the pH of the mucosa is disturbed. Engorgement of the turbinates forces resort to mouth breathing and the resulting hypothermia causes dryness of the oral mucosa with subsequent changes in the secretory qualities which, in itself, has a very important function to perform. There is a change also in the pH of the mucosa towards alkalinity.

Congestion of the pharynx, bronchi, and eventually the lungs occurs. The nerve pathways of the nose and mouth are affected which are the maxillary and mandibular divisions of the 5th that passes to the sphenopalatine ganglia, to the semi-lunar ganglia, to the brain stem and then to the respiratory center. The posterior pharynx is supplied by the 9th and 10th which also send branches to the semi-lunar ganglia.

The irritating effects of cold on these



GRAPH 3.

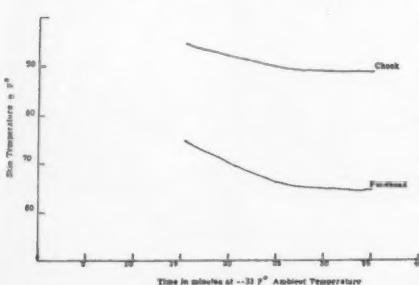
nerve pathways result in vasoconstriction of the capillary bed of the face, and the diminishing protective heat of the face causes freezing of the serum content of the skin so exposed.

The resulting ice rim that forms in the lips, nose, and mouth from the exhaled air acts as a transmitter for the cold. Changes in the body economy then take place at an inverse ratio to the time of exposure and the prevailing temperature.

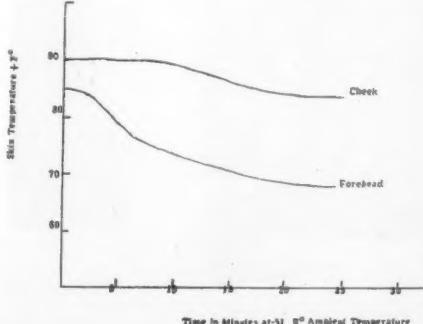
Wind velocity lessens the time of exposure necessary to achieve the condition known as frostbite which leads to freezing and ultimately death.

Man's ability to survive extremes of cold may be determined by the following formula: $(E \ 0^\circ T + WV = ST)$. E = exposure, 0° = temperature, T = time exposed, WV = wind velocity, ST = survival time.

To merely survive is not enough. Man must be able to carry on everyday life; he must have breathing comfort. With this de-



GRAPH 2.



GRAPH 4.

vice, there is no noticeable restriction of breathing even during vigorous calisthenic exercise. While there is a tendency for frost to form due to the moisture content of the expired air, this is quickly remedied by flexing the cannister.

Facing a wind of 20 mph at -45° , it was found that 2.5 minutes was the limit of tolerance while wearing the parka hood. The same subject, under the same conditions, wearing the device, experienced no discomfort at the end of 20 minutes, a rise of over 800% efficiency.

The readings of the following graphs were done by means of thermocouples, and it is interesting to note that the base temperature was $+65^{\circ}\text{F}$.

One of the important means contributing to fatigue is the imbalance caused by the loss of fluid in the expired air due to the reaction of cold inspiration. When the proper temperature of the inspired air is maintained, then dehydration will not occur.

In the event of severe injury occurring there is a rapid loss of body heat, and the ability to conserve the body economy lessens the degree of possible shock. The device was also designed to allow full vision, enabling an injured person to be closely observed; and, in the event that oxygen is required, this may

be supplied through a tube inserted into the cannister without removing the device and without any additional equipment whatever.

Full visibility without fogging is of extreme importance not only as a safety measure while climbing, servicing planes, standing sentry duty, manning lookout posts, and the handling of open boats, but as a means of combating the feeling of isolation that is conveyed by the wearing of confining equipment. Paratroopers must also be protected from face injuries and lacerations when landing on rough terrain and wooded areas.

SUMMARY

The features of a device that is flexible, having no moving parts, being light of weight, requiring no upkeep, designed to protect the respiratory tract and to conserve body heat under extremes of wind and cold, have been described.

In the final analysis, elaborateness or quantity of equipment is useless unless man is able to operate it regardless of the hazards imposed by the weather. It is felt that the above-mentioned device will help fill that need.

Bank Bldg.,
2 Thompson Square,
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ARMY SURGEON GENERAL'S MEDICAL MEETING

STERNBERG AUDITORIUM, WALTER REED ARMY MEDICAL CENTER

8:00 P.M., MARCH 20, 1958

Guest Lecturer—Justice William O. Douglas, The Supreme Court of the United States, will speak on his "Russian Journey."

Feeding Challenges in a Domiciliary

By

ISABELLE GILLUM DUBAR, Dietitian*

(With one illustration)

IN JULY 1948 a formal ceremony was held on a 104 acre reservation in Bonham, Texas to commemorate breaking ground for a Veterans Administration Center. By the summer of 1951 thirteen fire-proof brick buildings had been constructed. Admission for hospital and for domiciliary care began in November. In 1957 living quarters in Bonham and at the domiciliary were available to more than three hundred men. For these veterans there is an active "Planned Living Program" to make life today different from life in an old soldier's home of years ago. The hospital now has fifty-six beds for general medical and surgical patients. The needs of veterans in these modern, pleasant buildings challenge the Food Service to provide good eating and this begins with menus which keep out monotony and afford balanced diets.

The discussion to follow concerns feeding domiciliary members. These veterans look to dietitians for food that is carefully prepared and served in a manner that appeals to each and to each gives a pleasant illusion that the dietitian's first wish is for him to be happy and well-fed. By contrast to this major responsibility the ability of the dietitians in budgeting, requisitioning, supervising and other duties outlined in the position descriptions becomes minimized when viewed through the eyes of the member.

For the domiciliary institution, menu making starts with common sense and breakfast. There is no reuse of menus, no repetitions of a three week or twenty-eight day cycle, no menus representing the four seasons to pull from a file. Cyclic menus like all things have advantages and disadvantages. At Bonham the preference is to plan anew. Breakfasts here are not unlike those for Americans described in *GOURMET*.¹ For years many members have enjoyed a "Texas size" breakfast. It is these men who say

the first meal of the day is the best. Their breakfast pattern consists of fruit and/or juice, dry or hot cereal, egg to order, pork as bacon, ham or sausage, bread, butter or margarine, a sweet spread, milk, and coffee.

Since a feeding challenge in the domiciliary institution is the serving of a most satisfying breakfast, let us study some of the items for this meal in detail. One may use canned or stewed fruit such as apples, prunes, peaches, apricots, alone or in combinations, frozen strawberries, rhubarb, or peaches, and fresh fruits on the market or melons in season. Acceptable juices are pineapple, orange, apple, grapefruit (also in blends), tomato, prune, and grape. Because of varieties available, no one fruit or juice is served more often than twice a week.

An assortment of no less than five individual dry cereals is on the cold counter. Either farina, grits, or oatmeal is cooked every morning. These hot cereals are not to be relegated to the nursery. They are enjoyed the year through by men who in their hard working days ate a hearty breakfast. As domiciliary members they continue to appreciate the staying quality, flavor, texture, and vitamins of hot cereals.

Eggs are cooked to order: poached, soft and hard in the shells, scrambled, and fried. This service keeps a cook busy. However, food service in an institution tends to become routine—meals always at the same place and time, with the same people, who usually are in the same general order in the cafeteria line and sit at their accustomed tables. As a member's preference becomes known, his order of two eggs will be cooked without delaying the line. Six or seven mornings a week two strips of bacon, sliced twenty slices per pound from six to eight pound slabs, are served with the eggs. Once or twice a month frizzled ham, pork links, or a sausage patty may be planned. When bacon and ham ends have accumulated in the meat cutter's box, these are used in omelets and

* Chief, Dietetic Service, Veterans Administration Center, Bonham, Texas.

TABLE 1
PROGRAM PLANNER FOR MEAT DELIVERY

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|--|--|--|--|
| [1] Bacon Chuck 260# del. 8-30 | [2] Bacon 250# del. 9-2 Ham 115# del. 8-30 | [3] Bacon Omelet Fowl 120# del. 8-30 | [4] Bacon Veal Carcass 250# del. 9-2 | [5] Bacon Pork Butts 120# del. 9-2 | [6] Bacon Fish Sticks 60# del. 9-4 Dried Beef 8# del. 9-2 | [7] Bacon Beef Liver 60# del. 9-2 |
| Sardines | Ground Beef 70# | Cheese Souffle | Beef Cubes 70# | Cold Cuts 20# del. 9-2 | Deviled Eggs | Pork Links 45# del. 9-2 |
| [8] Bacon Fryers 180# del. 9-6 Ham-Cheese 112# del. 9-2 | [9] Bacon 250# del. 9-9 Chuck 260# del. 9-2 | [10] Bacon Lamb Legs 260# del. 9-9 | [11] Bacon Pork Loin 120# del. 9-9 | [12] Bacon Beef Round 260# del. 9-9 | [13] Bacon Perch 60# del. 9-11 Short Ribs 50# del. 9-9 | [14] Bacon Ham. 115# del. 9-9 |
| Rib Steak 360# del. 9-9 | Tunafish | Beef Cubes 70# | Turkey 150# del. 9-9 | Frankfurters 45# del. 9-9 | Parsley Omelet | Ground Beef 70# |
| [15] Bacon Rib Steak 360# del. 9-9 | [16] Bacon 250# del. 9-16 | [17] Bacon Fowl 120# del. 9-9 | [18] Ham Omelet Pork Butts 120# del. 9-16 | [19] Bacon Chuck 260# del. 9-16 | [20] Bacon Catfish 60# del. 9-18 | [21] Bacon Chuck 260# del. 9-16 |
| Salmon | Corn Beef 50# del. 9-9 | Fruit-Cheese | Ground Beef 70# | Ground Beef 70# | Giblets 25# Macaroni-Cheese | Spareribs 120# del. 9-16 |
| [22] Bacon Turkey 150# del. 9-16 | [23] Bacon 250# del. 9-23 | [24] Pork Links 45# del. 9-23 | [25] Bacon Beef Liver 70# del. 9-23 | [26] Bacon Rabbits 160# del. 9-23 | [27] Bacon Pork Loin 120# del. 9-23 | [28] Bacon Fowl 120# del. 9-23 |
| Cold Cuts 20# del. 9-16 | Ground Beef 70# | Beef Cubes 70# | Beef Chuck 260# del. 9-23 | Cheese Sandwich | Spanish Omelet | Beef Cubes 70# |
| [29] Bacon Omelet Ham 115# del. 9-23 Dried Beef 8# del. 9-23 | [30] Bacon 250# del. 9-30 Chuck 260# del. 9-23 Frankfurters 45# del. 9-23 | [] | [] | [] | [] | [] |

a choice is offered with eggs to order.

Hot biscuits are timed to come from the ovens to the serving counter in a steady flow. Dry white and whole wheat toast is always made as some persons like toast every morning. When biscuits, sweet rolls, french toast, and hot cakes are on the menu, some persons like to make combinations of these items with toast.

The quantity is unrestricted per serving for jelly and the like (served in one ounce souffle cups), also for butter or oleomargarine cut ninety triangles to the pound, and for half pint paper cartons of milk. Coffee is drawn to order and every effort is made to keep it heady and to preserve its fragrant aroma.

Second servings, the same size as the first,

are permitted to persons who have consumed their original rations and wish to walk back to the cafeteria counter. Additional coffee in thermos jugs is placed on the tables for convenience. Food Service workers help the more seriously disabled veterans at their tables. The gastronomic success of breakfast is indicated by the fact that approximately 94 per cent of the men are present.

As with breakfast, painstaking, fresh, and discriminating meals are planned for dinner and supper. Use is made of simple rules of flavor and texture, particularly of such characteristics as delicate or strong, crisp or smooth, firm or soft, sweet or tart to achieve desirable combinations.

Table 1 shows how VA form 7054 (PROGRAM PLANNER) outlines meat use and

TABLE 2

STUDY OF SALAD ACCEPTABILITY OF DOMICILIARY MEMBERS ON REGULAR DIETS

| Day | Head Count | Salad Choices and Number Eaten | | | Acceptability |
|-----|------------|--------------------------------|-----|-----------------|---------------|
| 1 | 262 | Cabbage-Egg | 93 | Cauliflower | 55 |
| 2 | 228 | Tomato-Pepper | 100 | Triple Fruit | 93 |
| 3 | 219 | Lettuce | 55 | Deviled Egg | 74 |
| 4 | 229 | Tomato-Onion | 90 | Cranberry | 78 |
| 5 | 282 | Apricot | 127 | Cottage Cheese | 52 |
| 6 | 259 | Mixed Vegetable | 154 | Stuffed Celery | 68 |
| 7 | 268 | Sliced Egg | 113 | Fruit Gelatin | 123 |
| 8 | 259 | Onion-Radish | 90 | Lettuce | 69 |
| 9 | 256 | Chef | 163 | Beet Relish | 35 |
| 10 | 279 | Lettuce | 127 | Purple Plum | 81 |
| 11 | 276 | Combination | 132 | Sardine | 82 |
| 12 | 265 | Tomato | 119 | Cole Slaw | 85 |
| 13 | 270 | Tossed | 91 | Apricot | 156 |
| 14 | 268 | Asparagus | 74 | Chef | 158 |
| 15 | 267 | Cantaloupe | 150 | Mixed Vegetable | 78 |

deliveries for a month. A copy of this form is given the meat cutter that he may properly store items, slice bacon and other pork products in advance of the date for using, and schedule his time to cut or grind poultry, beef, liver, lamb, and other meat on the day of use. This employee has frequently remarked how much he appreciates the form as a guide to keeping first quality meats² ready for cooking.

The *pièce de résistance* has now been planned for amount and by recipe. Other foods must fit around, contrasting and harmonizing to complete each day's menu. Dinner and supper choices are the usual vegetables, salads, desserts, beverages with fish entrees on Fridays. Members are free to choose. Their dietitians believe selective menus promote higher food morale than perhaps any other single factor in Dietetic Service. You may not agree with this; but you know the psychologic value of being able to choose should not be over-looked. Fortunately for Dietetic Service the selection may be from two items instead of a choice from three or more within a food group; and the effect is thought to be about as satisfying.

One of the biggest feeding challenges in a domiciliary is to provide likeable vegetables. The criticism need not be made here that vegetables are cooked indifferently, usually served on the same plate with the entree, because the men won't eat them anyway.³

Vegetables have the capacity to take on a variety of textures from the crisp or firm to the very light and tender; their flavors are bland to strong and sharp; many of them may be served hot or chilled; and their range of colors and shapes delight all artists. Recipes are constantly evaluated for distinctiveness, flavor, and ease of preparation. Insofar as it is practicable vegetables are cooked in small quantities during the serving period. Staggered timing may make the difference in poor and good acceptability. Cooks are cautioned about over and under cooking. Cooks are directed to season carefully, yet not to be timid in this respect; to taste for flavor and texture, for that something wrong, and for perfection. Too much emphasis can not be placed on good quality⁴ and eye-appeal; this will invite the members to take one half cup and discover the vegetables really tastes good. Members will then anticipate that the dish may be served again for each to enjoy its flavor and highly nutritious properties.

Table 2 indicates the domiciliary's enthusiasm for vegetable and fruit salads. Probably it can be said of salads more than any other item on the menu that the men can and do learn to accept new recipes. With any communal living arrangement, food habits must change. Prior to domiciliary care some men ignored salads. To them they were by tradition for women and were synonymous with summer. Here the patients make salads

important in their everyday food patterns.

Attractive salads are a daily "must" for several reasons. The caloric needs of most members have been reduced by limiting activity or by lowered metabolic rates of advancing age. For everyone salads may fulfill the dietary needs for a higher proportion of protective nutrients. Salads are a means of stimulating the appetites of persons who undereat and of giving bulk and a feeling of satiety to those who would overeat. Salads are also important to another group—members with large appetites who may be plagued by indigestion and such gastronomical troubles as constipation, heaviness, and flatulence. Always planned for dinner and occasionally for supper, salads are crisp, fresh, stouthearted, individually dressed perhaps with oil, vinegar, fine herbs, or a colorful garnish.

To get members to eat dessert is no problem. Their choices need directing, however. For many the selection will be that with the most sugar. Fruit freezes, ice cream, and sherbets are offered twice daily with fruit or a bakery product. During hot weather when appetites are likely to be dull and nothing seems to taste right, a frozen dessert is a most completely satisfying choice.

Until now feeding challenges in the domiciliary have been reviewed in regard to the regular menus. It is not that simple. The veterans' doctor finds approximately ten per cent require soft, bland, or diabetic diets. No prescriptions are given for reduction, high caloric, high vitamin, and other diets. Men needing such regimes are taught to choose from the regular menus.

Modified diet cards in plastic covers are issued by the dietitians. The diabetic's card will have listed the food exchanges of his prescription. At mealtimes a supervisor checks each card with the member's tray. Occasionally a dietitian works this assignment as shown in the illustration (Fig. 1). Checking a card emphasizes to the dieter the importance of "staying with it" and gives opportunity for questions and criticism. It is from such contacts that we evaluate our goal in domiciliary care: Is each member satisfied with his Food Service?



VA Photo

FIG. 1. Dietitian checks patients' trays.

SUMMARY

The needs of veterans in a modern domiciliary challenge the Food Service to provide good eating, three meals a day.

- A. Large breakfast is planned because for many this meal will be the best for the day.
 - (1) There is no cyclic system.
- B. Painstaking, fresh, and discriminating menus are planned for dinner and supper.
 - (1) VA Program Planner is used for meats.
 - (2) One of the biggest feeding challenges is to provide likeable vegetables.
 - (3) Salads can become important in the everyday food patterns.
 - (4) Choice of desserts must be directed.

Contacts with members on regular and modified diets help evaluate goal in domiciliary care: Is each member satisfied with his Food Service?

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Osteoid Osteoma of the 12th Rib

Resection Under Local Anesthesia—A Case Report

By

SENIOR SURGEON IRVING MAUER,* U. S. Public Health Service

(With one illustration)

MANY reports have appeared in the literature regarding the peculiar aspirin sensitivity of osteoid osteoma. This case is presented since removal of this peculiar lesion under local anesthesia has not been reported previously.

A 33 year old postal clerk was referred for treatment of pain in the lower chest for which diagnoses of neuroma or muscle strain were previously considered. The pain was described as being constant and localized to the lower left rib margin in the region of the anterior axillary line and was relieved for two hours by one aspirin tablet. Psychiatric evaluation was requested by the referring facility because of this salicylate sensitivity.

Examination revealed an area of exquisite point tenderness at the distal end of the 12th rib. The pain was localized and did not radiate.

X-rays revealed a small knob formation at the distal end of the 12th rib, with a sclerotic border and a relatively radio-lucent core. The diagnosis of osteoid osteoma was made and excision was proposed under local anesthesia.

On January 19, 1956, the skin over the 11th and 12th ribs was infiltrated with procaine and the lesion was exposed. Aspirin had been withheld and the patient therefore had maximum pain. The skin incision was made without any discomfort, however, the lesional pain became very acute on palpation of the small mass at the distal end of the rib.

Intercostal nerve blocks were made. These did not relieve the pain. The area of the lesion was infiltrated but there was no change in the pain picture.

The 12th rib was then stripped at a point about two inches from the lesion and the rib was transected. Immediately the patient became completely free of pain. The lesion

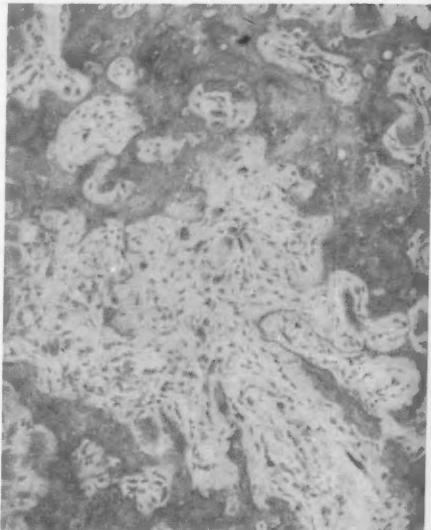


FIG. 1. Osteoid osteoma showing connective tissue with dilated blood vessels.

was removed and the wound was closed. The patient had an uneventful postoperative course with no recurrence of the preoperative pain, and no need for analgesic medication.

Pathological study of the lesion revealed a round mass which took up most of the rib structure at its largest point. Centrally in the lesion there was cellular connective tissue containing dilated blood vessels (Fig. 1). In and adjacent to this and extending towards the periphery of the rib were closely placed osteoid and newly formed bone trabeculae, with prominent osteoclasts and osteoblasts. The connective tissue between the trabeculae of osteoid and new bone was moderately cellular. Peripherally, and in sections adjacent to the central portion of the lesion there was sclerosis of bone.

The diagnosis of osteoid osteoma was made by our pathologist Dr. Theodore L. Perrin, and confirmed by our consultant pathologist, Dr. Henry L. Jaffe.

* Assistant Chief of Surgery, in Charge of Orthopedics, U. S. Public Health Service Hospital, Staten Island 4, New York.

Use of Chlorpromazine in Cough, with Particular Reference to Whooping Cough

By

LOTHAR WIRTH, M.D.

THE treatment of whooping cough has not been altered by the new era of antimicrobial drugs. The treatment centers, therefore, around the time honored experience that severity and number of paroxysms can be markedly lessened, if the patient can be kept at physical and mental ease.

In this disease, activity and excitement may bring on attacks of coughing and vomiting. At a time when tranquilizing drugs are almost daily in our literature, it is a natural thought to use them in whooping cough. I, therefore, prescribed syrup of chlorpromazine in the last 30 cases that came under my care. This drug was selected as it has not only a depressant action on the cerebral cortex but also on the vagus which controls reflexes from the larynx, trachea, and bronchi, the seat of pathology in pertussis. This medication will reduce secretions from those airways and while it can, in proper dosage, induce normal sleep (according to tracings with the electroencephalogram) it does not interfere with the respiratory center.¹

The age of the children ranged from three months to 12 years. The dose of syrup of chlorpromazine varied from 5 drops to 20 mg. every three hours, but was increased if the course of the disease demanded. I can report that in all 30 cases the results were highly satisfactory. A disease, which hitherto, particularly in the small child, required 24 hours' nursing care and several attendants, was transformed into one with a mild, useful cough—which should not be suppressed and no interference with the normal daily routine of those children.

Cough is a very common complaint. How many patients do we see without organic pathology to account for it! On the other hand how many people do have appropriate organic disease and yet no complaint of

cough! Furthermore, could any one doctor predict from physical or x-ray examination who might have a cough and does not?

The presence of a foreign substance in our air passages should produce physiologically the cough reflex. Since irritation of the ear-canal can also set off this reflex, even normal physiology does not always serve a useful purpose.

Studies on the psychopathology of cough clearly demonstrated the interrelationship of somatic and psychic forces.² It was pointed out that cough can absorb attention, that people with a hysterical superstructure will continue to cough long after the organic cause has been removed, that cough can be a tic, part of a conversion syndrome, and so on. There is also a report where hypnosis saved a child from death due to exhaustion from cough which could not be stopped by other means.³

From these considerations as well as the experiences with whooping cough, I decided to use chlorpromazine as a routine measure in all cases where cough was the outstanding symptom. Where indicated antimicrobial and antiasthmatic drugs or other measures were used also. Only the oral drug was prescribed. While there are reports on the use of chlorpromazine in status asthmaticus, in asthma, chronic bronchitis and emphysema,⁴ I used the drug, with or without organic pathology, in all those cases requiring symptomatic treatment for cough. In such cases I saw 90 patients. There were cases with metastatic cancer to the lung, emphysema, bronchitis, common cold and those without obvious pathology. The usual dosage was 10 mg. four times daily. The drug was useful in the majority of patients in relieving cough, apprehension, and nausea and vomiting, which so often is not only a symptom of cough, but a frequent side reaction of various cough medi-

cines. As chlorpromazine has pharmacological action on air-passages as well as on cortical brain tissue, it is a rational psychosomatic drug in cough.

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82 Broadway

Rensselaer, N.Y.



TURKISH MD'S BEGIN OVERSHIP TRAINING FOR ONE YEAR AT THE NATIONAL NAVAL MEDICAL CENTER, BETHESDA, MARYLAND



Official U. S. Navy Photo

(L to R): Capt. C. B. Galloway, MC, USN, Commanding Officer of Medical School; LCDR Ercument Bingol, MC, TN; CDR Galib Gultekin, Ass't. Turkish Naval Attaché; LCDR Zafer Ortacgil, MC, TN; CDR Bedri Unal, MC, TN; LT Fifri Senocak, MC, TN; LCDR Turgut Altug, MC, TN; LT Nihat Balkin, MC, TN; and Capt. W. L. Engelmann MC, USN, Acting Commanding Officer of the U. S. Naval Hospital, NNMC, Bethesda, Md.

The Courageous Medics of Anzio, III*

By

COLONEL ROLLIN L. BAUCHSPIES, MC, U. S. Army

14

MY FIRST morning on the beachhead was spent in getting acquainted with the necessary administrative paper work attendant to my new assignment. This consisted chiefly of getting reports of casualties from the several division surgeons, the bed-census from the various hospitals, the report of evacuation from the beachhead during the previous twenty-four hours, routine sick and wounded reports and data concerning other happenings that affected the operation of the medical service and which might be of interest to the Corps Commander or the members of his staff. At 1100 hours I attended the daily briefing held in the G-3 Section. It was there that I learned of the actual situation existing on the beachhead. Each staff section chief reported factual data to familiarize all with what was actually occurring in the Corps from the number of patrols lost to the numbers of planes shot down by our anti-aircraft defense and the number of tons of supplies brought ashore. It wasn't an assuring story that I listened to for both G-2 and G-3 portrayed a rather grim and critical situation of the Corp's position. When I was a student at The Infantry School, Fort Benning, Georgia, I was taught the necessity for and the tactics of a "final protective line" and witnessed demonstrations of its employment. Here on the beachhead a final defense line had already been established. The Corps was wired in and defensive mine fields planted; all weapons available to the Corps were so sighted as to be able to rain down a curtain of fire in front of this line where the Corps would make its last stand. Any assault by

the enemy against this position would prove to be costly. Since we were not in a position to take up the offensive and fight a war of movement and maneuver the tanks of the armored division were dug in and used to augment our artillery fires.

At the briefing I was called upon to give the medical situation, listing the number of casualties received at our hospitals and the number evacuated from the beachhead. This latter figure was all important for our forces were dwindling. Corps losses were greater than the number of replacements reaching the beachhead.

In the afternoon I ordered a reconnaissance car from the Corps motor pool and together with Colonel Brewster and a driver drove off to contact the division surgeons, visit the hospital area, and survey the various echelons of medical service. Riding about on the beachhead was not a pleasant experience in the dismal winter weather. The bards who wrote of sunny Italy had certainly had no part of the Fifth Army existence in Italy during the winter of 1943-1944. The tops of the vehicles were not permitted to be raised—this was to enable the occupants to vacate the vehicles in a hurry whenever enemy planes came over to strafe the roads. The floors of the vehicles were covered with sandbags—protection for our lower limbs in case we should run afoul of a mine. The glass windshield had to be lowered—just in case the sun should come out and cause a reflection. German observers on the hills were ever on the alert to spot any movement on the beachhead and anything that moved or drew attention also drew enemy fire. This was all SOP—and left us fully exposed to the elements as we moved about the beachhead.

My first desire was to visit the American Forces so we drove to the Headquarters of the 3rd Division located in the woods east

* First installment in January 1958 issue of MILITARY MEDICINE.

CORRECTION, pg. 53. Gen. Martin died April 13, 1957.

of the hospital area and south of the coastal road. There we found Lieutenant Colonel Frank R. Drake, Medical Corps, the Divisional Surgeon. We learned that the divisional medical service was functioning effectively and that both the divisional clearing station and headquarters of the divisional medical battalion (3rd) were occupying positions within the hospital area. The division was employed in defending the west branch and part of the main portion of the Mussolini Canal which formed the right flank of the Corps. The remainder of the main portion of the canal forming the Corps' flank and which lay between the 3rd Division and the coast was held by the 1st Special Service Force. There were no problems of evacuation since the collecting stations were operating well and the clearing station was adjacent to both the field hospital and the evacuation hospitals. Leaving the 3rd Division headquarters we drove north up the Nettuno-Cisterna Road in the direction of Le-Ferriere to visit the clearing station of the 45th Division located about one mile north of Nettuno.

The headquarters of the 120th Medical Battalion (45th Division) occupied the same area as the divisional clearing station. I was fortunate in finding the Division Surgeon, Lieutenant Colonel Nesbitt L. Miller, Medical Corps (Oklahoma City, Oklahoma), in the area and was able to confer with him and Major Patrick H. Lawson, Medical Corps, the Commanding Officer of the medical battalion. The 45th Division had part of its troops holding the left flank of the Corps along the Moletta River with the bulk of the divisional troops responsible for the central sector of the beachhead forward line. The site occupied by the clearing station was in a shallow depression which had very little defilade. This area had already been shelled at night and was considered to be untenable. We discussed plans for early movement to a safer place. We accompanied Colonel Miller and Major Lawson and proceeded farther on up the road to visit one of the divisional collecting stations. This medical

unit had dug itself into the side of a bank and the treating of casualties was carried on practically underground. There was no natural cover or protection from enemy action available in that area.

On our return from visiting the collecting station we stopped at the hospital area. We discussed present problems with each of the unit commanders occupying this important site: Colonel Blesse of the 56th Evacuation Hospital, Colonel Leaver of the 15th Evacuation Hospital, Colonel Currier of the 93rd Evacuation Hospital, Captain Newman of the 33rd Field Hospital, Lieutenant Colonel Johnson of the 52nd Medical Battalion and Lieutenant McCarthy of the 3rd Medical Battalion. All were busily occupied with their mission of caring for the sick and wounded and all were concerned in devising effective means for the protection of both their patients and personnel from enemy bombing and shelling. Colonel Blesse ac-



FIG. 14. Underground Quarters for Personnel in Hospital Area.

accompanied us as we surveyed the area and viewed the wreckage wrought by the previous night's bombing. I was very much impressed by the ingenious methods employed by the hospital personnel in providing safety for their patients and for themselves. There was no luxury in any of the quarters which were mainly glorified fox-holes and dug-outs revetted with whatever materials were immediately available. With Colonel Blesse I also visited Lieutenant Ainsworth as previously mentioned in this account.

My survey of the American medical units on the beachhead revealed several conditions that would require my immediate attention. We returned to our headquarters to complete our daily routine administrative duties and to discuss among ourselves the problems needing solution. The chief areas to be resolved were the crowding and concentration of all major medical installations in the hospital area, the causes and prevention of non-battle casualties—these included trench foot, battle exhaustion, anxiety cases, malaria, respiratory and venereal diseases. For the next few days all members of the Corps medical staff did a lot of thinking as we revolved in our minds various plans which might solve some of these problems.

The following day we made a similar trip

in company with Lieutenant Colonel Briggs to visit the 2nd Casualty Clearing Station. I met Lieutenant Colonel Dan ("Dangerous Dan") McVicker, Royal Army Medical Corps, who was in command of the unit. As we had tea with Colonel McVicker and members of his staff we discussed his problems. His unit had moved out of the dangerous port area and was occupying an open field where it had already been subjected to enemy shelling and bombing. We noted the extensive damage suffered during the enemy air raid of 12 February. Colonel McVicker used a small building as a dressing station and a place to house his more seriously wounded. There had been three patients in a small room about ten feet square the night of the raid. One of the anti-personnel bombs had dropped through the tile roof and exploded when it hit the concrete floor. One of the patients was killed but the other two miraculously escaped further injury although the room and its contents were a complete shambles. We also visited the 15th CCS which had recently reached the beachhead and had moved to a site to the north and adjacent to the area occupied by the 2nd CCS. Leaving the CCSs we made a brief stop at the headquarters of the 1st British Division where I met Lieutenant Colonel



FIG. 15. 16th Evacuation Hospital at Vairano, Feb. 1944.

Anderton, RAMC, the ADMS of the division. It was necessary for me to hurry these visits so that I could return to Corps headquarters in time for the daily briefing.

At the second staff briefing that I attended I learned more of our precarious position on the beachhead. The enemy had succeeded in wiping out the Campoleone salient and captured the Factory, Caroceto and Buonriposa ridge west of the Albano road during their offensive which had begun on 1 February. The possession of this commanding ground in front of the VI Corps position gave the Germans a spring-board from which they could launch their main attack against the beachhead. Successive counterattacks, made chiefly by the 45th Division, to regain this strategic area were unsuccessful. The Germans had sown hasty mine fields and controlled the open fields with murderous fire from automatic weapons. Enemy counter-attacks also pushed back what little gains the beach defenders were able to achieve. It would require a major effort on the part of VI Corps to retake the Factory area. The Allied Air Force allotted heavy air support for this operation but bad weather nullified or curtailed the program.

The British hospitals continued to receive bomb hits in their areas. On 17 February about 0200 hours two bombs exploded in the fields occupied by the 2nd and 15th CCS. Two of the British hospital personnel were wounded and one patient, who had just had a laparotomy performed and an inoperable cancerous condition discovered, was killed. Two days later enemy bombs killed two patients in the 15th CCS.

In an effort to affect less congestion in the hospital area and disperse the medical installations, I made a complete reconnaissance of the beachhead. I was unable to find any more favorable site which would afford protection from artillery fire. On 14 February the 3rd Division Clearing station accompanied by the 1st Platoon, 33rd Field Hospital was moved from the hospital area to the vicinity of Acciarella, about three miles east on the coastal road. That this move

failed to resolve the situation was soon apparent.

15

One of the first duties assigned to me by the Corps Commander was to report on the manner of performance of duty by the nurses of the 33rd Field Hospital and of the 56th Evacuation Hospital during the shelling and bombing of those units earlier in the month. General Lucas desired to make appropriate awards to those who had conspicuously displayed great courage and distinguished themselves under fire. I conferred with both hospital commanders, Colonel Blesse and Captain Newman, and obtained a list of the nurses whose conduct while under enemy attack warranted special recognition. The names of these nurses were submitted to the Corps Commander together with the recommendations of both unit commanders. It was rather difficult, in fact, impossible to single out any individuals as all of the personnel had remained at their respective duty stations and continued the performance of duty in caring for the wounded despite the shellings and bombings of their



U. S. Army Photo

FIG. 16. General Lucas awards Silver Star Medals to: (L to R) 1st Lt. Mary L. Roberts, ANC; 1st Lt. Elaine Roe, ANC; and 1st Lt. Rita V. Rourke, ANC.

units. All had done and continued to do a splendid job in the face of real and constant danger. The selection of the recipients of awards was made by the Corps Commander.

On the morning of 21 February I accompanied General Lucas to the hospital area where he awarded Silver Star Medals to First Lieutenant Mary L. Roberts, Army Nurse Corps (Dallas, Texas), 56th Evacuation Hospital; to First Lieutenant Elaine Roe, Army Nurse Corps (Whitewater, Wisconsin), and to First Lieutenant Rita V. Rourke, Army Nurse Corps (Chicago, Illinois), of the 33rd Field Hospital. It was a simple decoration ceremony that was held in front of the flag pole at the 56th Evacuation Hospital. When the Corps Commander arrived at the hospital the nurses were summoned from their places of duty and after receiving their decorations they returned to their work.

First Lieutenant Mary L. Roberts, Army Nurse Corps, Chief Nurse of the operating section, 56th Evacuation Hospital, became the first nurse to receive the Silver Star Medal during World War II. (The Silver Star Medal is awarded to a member of the Armed Forces who distinguishes himself or herself by gallantry in action.) It is believed that these three nurses were the first women to receive the Silver Star Medal in the history of the United States Army. Many of the personnel of these hospitals received decorations and awards later for their valiant services on the Anzio Beachhead.

(In an article entitled, "Where Are the Heroes of World War II?", appearing in Collier's Magazine, December 7, 1956, the author included Elaine Roe Pieper as an Army nurse at Anzio and stated that Lieutenant Roe is married to Morris Pieper and is presently living at Mount Morris, Illinois.)

16

During my first week on the beachhead the chief concern of all was that of our ability to stay there. Practically all conditions favored the enemy for launching an all-out

attack against us. The road net spread out to the south and southeast from Carroceto and enabled the use of armor; three miles of open country lay between the Factory area and the final beachhead defensive line; and, there were no natural obstacles to impede their advance. If the enemy could reach the VI Corps line he could deploy his favorite tactics of infiltration through the Padiglione woods, which spread from the beachhead defensive line almost to Anzio.

Allied air reported the reorganization of enemy forces, the forward displacement of their artillery and the movement of heavy traffic on the railroads and roads leading from the Rome area to the beachhead. It was expected that the main attack would come down the Albano Road but that there would be diversionary attacks all along the VI Corps front. The German high command counted on their superiority in numbers and heavier artillery for success. On 11 February Hitler personally had given his approval to the plan of attack.

Meanwhile the allied troops of the VI Corps dug in with grim determination and prepared themselves to absorb the impact of the coming attack. The remainder of the 56th British Division moved to the beachhead from the southern Fifth Army front. The 167th Brigade arrived on 13 February followed by the 169th Brigade on 19 February. The 168th Brigade had arrived earlier (3 February) and was already committed to action.

With the arrival of the 167th Brigade the 1st British Division was relieved and passed to Corps reserve. The 167th Brigade took over the sector on the Moletta River line held by elements of the 45th Division. On the eve of the German attack the sector held by the 1st British Division was divided between the 56th British Division on the left and the 45th Division on the right. The 36th Engineer Combat Regiment held the portion of the Moletta River from the beach to the left of the 56th British Division.

Between 12 to 16 February Corps artillery and anti-aircraft units were built up. The

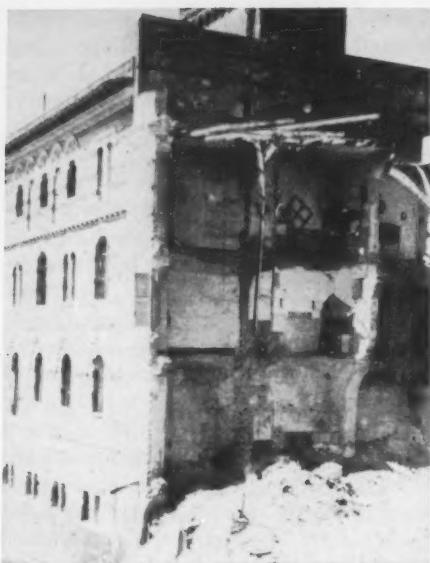


FIG. 17. "The summer hotels and palatial villas along the water front were gradually being reduced to rubble."

Air support directed its attacks on the enemy heavy caliber guns. By 14 February Allied artillery were firing about 20,000 rounds per day, thickened by the fire from Allied destroyers and cruisers lying off the harbor. The enemy artillery fire falling in the harbor and beachhead areas was estimated to be not more than 1500 rounds daily prior to 16 February.

The Germans increased the tempo of their air effort and artillery attack prior to launching their main offensive. On 15 February there were eight air raids in the Anzio area which succeeded in destroying an LST and a Liberty ship. The summer hotels and palatial villas along the water front were gradually reduced to rubble.

Before first light on 16 February there was no evidence of an impending attack—but the very silence was ominous. At 0600 hours the enemy guns opened up along the central beachhead front. Partly concealed by the smoke of the bursting shells, the German troops moved forward across the open fields to strike the outpost line of the beachhead

defense. The brunt of this attack was borne by the 45th Division which held a six mile sector of the front and which coincided almost exactly with that part of the line upon which the Germans had determined to concentrate their assault. At approximately 0630 hours enemy troops, supported by tanks, pushed forward against the 157th and 179th Infantry Regiments holding the left and center of the 45th Division front.

Taking advantage of the network of roads in the area groups of from four to eight tanks would issue forth from the Factory to pour fire at point-blank range into the fox-holes of American troops.

During the morning all attacks on the 179th Infantry were beaten off with heavy losses to the enemy. When the infantry outposts were forced back by enemy tanks and infantry attacking from the Factory the doughty defenders of the main line of resistance refused to yield. The enemy seemed to pay no attention to the number of casualties they suffered in these attacks. As fast as one wave of the attackers was broken it was replaced by another. Late in the afternoon the pressure on the 179th Infantry eased; the troops were given an opportunity to reorganize and many of the men reported missing earlier filtered back to their units.

Allied artillery fire produced a heavy toll among the troops that engaged in the assault

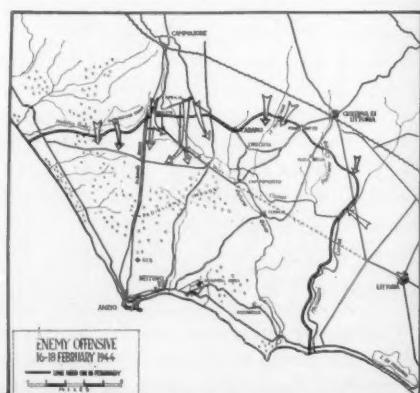


FIG. 18.

on the 179th Infantry and this factor robbed the German assault of its momentum. Enemy tanks as well as infantry suffered heavy losses in these attacks.

The greatest intensity of the artillery fire preceding the German attack fell along the front of the 157th Infantry which defended the line astride the Albano road. At 0730 hours the fire lifted and enemy infantry and tanks struck the left flank in the rough country west of the Albano road. Every attempt to infiltrate its positions were beaten off. Although smaller units of the defenders were practically wiped out the enemy failed to press his advantage and the fighting in this area died toward evening.

Lighter blows fell upon the 180th Infantry holding the right flank of the 45th Division. No deep penetrations had been made anywhere along the 45th Division front.

At the same time that the main enemy assault was directed against the 45th Division diversionary attacks were launched against the 3rd and 56th Divisions holding the right and left flanks of the central beachhead defense line respectively. In the 3rd Division sector the enemy attacked no less than six different points with various sized forces. The principal attack came from the northwest which was driven back in a state of disorder by accurate Allied artillery fire. The advance was stopped but the enemy kept up the pressure until mid-afternoon when heavy losses caused the German forces to call a halt.

On the 56th British Division front the enemy's initial attack had more success. The Germans, striking from the Buonriposo ridge, penetrated the lateral road along the final beachhead defense line before they were stopped by tanks of the 46th Royal Tanks and local counterattacks. The enemy made no effort to exploit the penetration and the 56th British Division was able to counterattack. By noon it was apparent that the attack on the 56th British Division was intended to do no more than support the main offensive down the Albano road.

In addition to laying down preparatory

fires for their infantry attacks enemy artillery on 16 February delivered the heaviest counterbattery fire yet experienced on the beachhead. In the early morning hours the fire was concentrated on the 45th Division artillery then shifted to the positions of the Corps artillery. Enemy artillery had also ranged in on the Nettuno airstrip; firing over the hospital area they destroyed four Spitfires as they were about to take off. The field had to be abandoned during daylight hours and all fighter protection provided from fields in the Naples area. Enemy planes and long-range guns concentrated on preventing supplies from entering the port. On 16 February the enemy air effort reached its peak but the results achieved were not commensurate with the effort expended. The XII Air Support Command flew 34 missions in sustaining the VI Corps. The main air effort which had been planned for the Cassino front was shifted on short notice to the beachhead.

At the end of the first day of the big push the enemy had made only slight gains in the sectors of the 45th and 56th Divisions at considerable cost in tanks and personnel. It was evident that most of the attacks were diversionary and calculated to wear down the strength of the defending troops and to pin down reserves. The enemy had not yet committed his main force.

Before midnight, 16/17 February, the enemy resumed the attack in the critical Albano road sector. During the night the enemy moved forward by infiltration and slowly wiped out the forward positions around both flanks of the 157th Infantry. The 179th Infantry were also under attack and efforts to contact the 157th Infantry were unsuccessful. A dangerous gap was opening between the two regiments.

The enemy lost no time in exploiting the tactical advantage he had won by his successful night attack. Striking swiftly and in force, he pressed through the gap he had opened along the Albano road. At 0740 hours, thirty-five enemy planes bombed and strafed the 45th Division front line and a

few minutes later the 179th Infantry was under heavy attack. Many tanks in small groups supported the enemy infantry. Again at 1040 hours, more than forty enemy planes were over the front line bombing and strafing. As early as 0855 hours the enemy had succeeded in driving a wedge two miles wide and over one mile deep into the center of the 45th Division front.

VI Corps brought all the resources of its superior artillery and air power to the aid of its hard pressed infantry. Tanks of the 1st Armored Division and 90 mm. anti-aircraft guns were employed against ground targets while two cruisers assisted with the fire of their naval guns from the flanks of the beachhead. All the means of the XII Air Support Command were put at the disposal of VI Corps. 731 sorties were flown by bomber and fighter-bomber planes which included B-17s (Flying Fortresses), B-24s (Liberators), and Mitchell and Marauder medium bombers. During the hours of darkness Wellington bombers patrolled the roads leading to the beachhead. The air attacks were chiefly directed on Campoleone and targets on the Albano road. The Factory and Carocetto were blasted again and again. The total weight of bombs dropped was the greatest up to that date ever allotted in direct support of an army. The term, "direct support," was no misnomer. Many bomb loads dropped only a few hundred yards from our front line. To the weary troops looking up from the muddy, blood-stained battlefields the view of formation after formation of giant bombers sweeping majestically over the beachhead was a cheering sight.

During the afternoon the enemy attempted to broaden and deepen the salient he had won. Fresh troops were ever being committed, battalion after battalion was rotated in order to keep fresh troops in the attack. Units battered by our intense artillery fire and bombing were withdrawn and reorganized. The main pressure continued to be exerted down the Albano road and to the east of it against the 179th Infantry. On the west side of the highway units of the 157th

Infantry were almost surrounded. Late in the morning General Harmon employed a battalion of medium tanks of his 1st Armored Division to support the 179th Infantry in a counterattack and by 1400 hours had advanced a short distance up the Albano road. Road bound and under fire from enemy tank guns the counterattack made little progress. At dusk they were withdrawn but they had succeeded in holding off enemy armor.

The enemy penetration down the Albano road brought the Germans dangerously close to the final beachhead line of defense. In order to relieve the pressure on the 45th Division General Lucas sent the 1st British Division, less the 3rd Brigade, to hold a two mile sector of the final beachhead line of defense across the Albano road in the vicinity of the first overpass. The 1st British Division tied in with the 56th British Division on its left and with the 179th Infantry on its right. The 56th British Division had succeeded in wiping out the wedge that was driven in its sector the previous day.

At this time there were some changes of personnel affecting the major units defending the beachhead. Major General G. W. R. Templar took command of both the 1st and the 56th British Divisions when General Penney was wounded and had to be evacuated. General Truscott left the 3rd Division to become the Deputy Commander of the VI Corps. The command of the 3rd Division fell to the Assistant Division Commander, Brigadier General John W. "Iron Mike" O'Daniel.

In an effort to lessen the depth of the enemy penetration and to obtain a more defensible line, General Eagles ordered the 179th and 157th Infantry Regiments to counterattack on the night of 17/18 February and to advance about 1000 yards. The enemy had already succeeded in bringing up machine guns and consolidated his gains along the Albano road. The troops making the counterattack encountered such heavy fire that it did not get very far and fell short of its objective.

All through the stormy night of 17/18 February the enemy moved up fresh units in preparation for a knock-out blow and even the counterattack of the 179th Infantry did not prevent him from continuing his customary tactics of infiltrating small groups under cover of darkness. During the night hours he paid special attention to the shoulders of the salient. On the left, enemy units infiltrating along the ravines which drain into the Moletta river got between the 56th British Division and the 157th Infantry. Enemy artillery worked over the units holding the final beachhead line. Behind this screen of activity the enemy completed preparations for what was to be his supreme effort to effect a breakthrough. Armor continued to be used in small groups but on a more extensive scale than on any previous day. Each infantry unit had tank support.

The enemy launched his first thrust at dawn. Capitalizing on the confusion resulting from the night infiltration and the unsuccessful Allied counterattack he thrust deep into the positions of the 179th Infantry. These initial attacks were not in great strength and were beaten off. The ring of barbed wire surrounding the beachhead defenders was littered with the bodies of dead and moaning Germans. Allied losses were extremely heavy and difficulty was experienced in mending the breaks in the wire and in manning the machine guns covering the Albano road. Some ammunition had reached the forward troops during the night but no food or water had been brought up for two days. The wounded had to be left in water-logged slit trenches where medical aid men gave them what help they could offer. Although the infantry attacks could be and were repulsed there was no relief from the relentless cold, sleepless nights nor from the constant pounding the men were taking from artillery fire.

The bloody struggle continued all morning under an overcast sky which prevented a repetition of the previous day's tremendous program of air support. Fighter bombers flew 120 sorties and gave effective close sup-

port against enemy tanks and infantry and 24 light bombers covered the Factory area with fragmentation bombs. Medium and heavy bombers were unable to get off the ground. However, there was no reduction in the amount of artillery fire which fell on the attacking troops.

At 1400 hours the situation appeared to be desperate and Colonel William O. Darby of the U. S. Rangers took command of the 179th Infantry. Only one battalion was capable of organized resistance. General Eagles had ordered him to hold the final beachhead line at all costs and he ordered his battalion commanders to reorganize and gather up all stragglers and physically fit men from the rear echelon.

On the right of the 179th Infantry, the 180th Infantry was still largely intact. Most of the division's anti-tank guns had been knocked out or overrun during the fighting of the last three days. Tank destroyers were dug into the marshy ground and once in place were difficult to remove; in some cases they had to be abandoned when the infantry withdrew. In the late afternoon of 18 February, as the enemy prepared to make his heaviest attack of the day, the Allied defenders of the Anzio beachhead faced their critical test.

The renewed enemy attack started with a thrust by twelve tanks down the "bowling alley." Strung out along the road the tanks were able to fire directly into the fox-holes of the 180th Infantry. Under the cover of this fire the enemy attacked. By 1750 hours the fighting was general along the whole front of the salient. Small enemy units managed to infiltrate through the area of heavy brush growing along the regimental boundary north of the road where the line of defending troops was thin. The enemy force had been whittled down until it was too weak to exploit its penetration and the infiltrating units were wiped out during the night. Farther to the west, the 179th Infantry and the 1st British Division fought the enemy troops for four hours as they attempted to break through east of the overpass. At one time

they penetrated as far as the lateral road but were driven back in desperate hand to hand fighting. Tanks of the 1st Armored Division patrolled the lateral road and helped the infantry hold off the enemy until the force of the attack was spent. Compelled to advance across open country the enemy was taking a terrific loss in casualties from artillery, mortar and machine gun fire. At 2130 hours there was evidence that the enemy was pulling back to reorganize. Never again was he to come so close to rolling up the final beachhead line.

During the night of 18/19 February the 45th Division took advantage of a temporary lull in the enemy attacks to strengthen its position while VI Corps assembled a counterattack force.

The 180th Infantry, although it had been under constant artillery fire and local tank and infantry attacks, suffered comparatively light losses. Holding the right shoulder of the salient the 180th Infantry took advantage of the night hours to readjust and shorten its line.

In view of the possibility that the enemy might employ airborne troops in conjunction with a continuation of his infantry and tank attacks, VI Corps on the afternoon of 18 February issued an order dividing the beachhead into zones of defense against airborne attack. Within each zone a mobile force was held on the alert and all roads were constantly patrolled during the hours of darkness.

The enemy devoted the night hours of 18/19 February to assembling his forces for what was to be his last serious effort to break through the final beachhead line of defense. At 0400 hours on the morning of 19 February enemy medium and heavy caliber artillery fires were laid down along the forward edge of the salient followed ten minutes later by an infantry attack. The 45th Division artillery replied with prepared defensive fires concentrating on the front of the 179th Infantry and the right flank of the 1st British Division. The enemy penetrated the British sector as far as the lateral

road but the left shoulder of the salient remained firm. By 0800 hours the effective use of artillery and 1st Armored Division tank fire caused the enemy forces to withdraw. During the morning hours enemy tanks tried repeatedly but unsuccessfully to operate down the Albano road. At noon when the enemy tried a final infantry attack down the same axis it was effectively broken up by artillery fire before contact was made. Although there was an increase in enemy air effort over the previous day the peak of the enemy offensive had been passed.

While the enemy was reorganizing for his last effort to crack the final beachhead line of defense VI Corps completed preparation for a counterattack. Two forces were to be employed—one under General Templar and the other under General Harmon. The original plan was to have the two forces attack simultaneously to pinch off the enemy troops in the salient. The newly arrived 169th Brigade on the beachhead which was to be used in General Templar's force was delayed in getting its equipment ashore. Enemy planes had dropped naval mines in the harbor of Anzio during the night of 17/18 February and the port had to be closed until the mines were cleared. Only General Harmon's force was able to jump off at dawn on 19 February.

All of the beachhead artillery supported General Harmon's attack and 132 fighter-bombers and 48 medium bombers struck at the Factory and enemy assembly areas. The attack proceeded along the axis of the "bowling alley." At 1620 hours, 19 February, General Harmon called a halt as he had reached his objective. During the afternoon of the same day the 56th British Division wiped out the enemy penetration in its area. Over 400 prisoners were taken by VI Corps in its successful counterattack. It was evident that by evening of 19 February that VI Corps had won its battle.

The fighting on 20 February beginning with a small enemy attack at 0430 hours which was easily repulsed gave conclusive evidence that the Germans had committed

all of their reserves and no longer had fresh troops to carry out their effort to breach the beachhead line. Other German attacks that day ended in confusion by the enemy and the participating troops were practically annihilated. The repeated attempts of the enemy to attack the shoulders of the salient during the morning of 20 February in an effort to achieve a breakthrough ended in being a bloody debacle.

The German forces lost heavily in personnel and equipment during their drive to wipe out the Anzio beachhead. During the five days of their attack, from 16 to 20 February, the enemy suffered more than 5,000 casualties in killed, wounded and missing. VI Corps took more than 600 enemy prisoners. On 21 February the 179th Infantry counted about 500 bodies lying in front of their sector. It was reliably reported that the Germans had stacked their dead like cord wood in piles of 150 each and bulldozers were used to dig mass graves for over 1,500 bodies.

The successful battle fought by the Allied troops to hold their beachhead was won at a price lower than that paid by the enemy but still high enough to cause concern to the already depleted units of VI Corps. During the period 16 to 20 February the landing of new units increased the strength of VI Corps from 86,915 to 96,401; but the beachhead forces were still 21,268 less than their authorized strength. Battle casualties during this period totalled 3,496 killed, wounded and missing. The Germans reported the capture of 1,304 Allied prisoners. Exposure, exhaustion and particularly trench foot, the latter resulting from days spent in fox holes half filled with water, resulted in a total of 1,637

nonbattle casualties. Losses would not have been so high if the troops could have been withdrawn from the line for brief periods of recuperation. During the month of February there were no quiet periods on the beachhead. Every man was needed and the steady drain on the lives and energy of the defending troops never ceased. VI Corps was forced to defend a front of nearly 35 miles with less than five divisions of troops which situation necessitated that many of them remain in the line continuously for a month. At the same time the opposing German forces entailed nearly ten divisions, many of whom were fresher.

Concentration of enemy artillery fires on both sides of the Albano road subjected the defending troops to a merciless pounding. But it was the stubborn resistance of the Allied troops that was the chief factor in staying the enemy and holding the Anzio beachhead. The fighting spirit of the individual Allied soldier played an important part in the effort of VI Corps to successfully defend the beachhead. It was the will to win which gave them their strength to hold. The men of VI Corps had won the major battle in defense of the beachhead.

The heroic stand made by the Allied troops between 16 and 20 February proved that VI Corps was on the Anzio beachhead to stay although the small amount of Italian real estate that had been wrested initially from the enemy had shrunk after the Germans had been stopped in their effort to drive the Allies off the beachhead. A new confidence in their ability to withstand any future assaults pervaded all units of the Corps.

(To be continued)



EDITORIALS

Our Libraries

NATIONAL LIBRARY WEEK will be observed March 16-22. This is the first of such an observance to emphasize the importance of our libraries and of reading.

Reading, of course, presupposes a recording of the written word. We now wish some of the forefathers had been a little more meticulous in recording what was happening during the eons prior to the recorded history of mankind.

For years after man started to record some of his thoughts and events of his life, books were hard to come by; men labored many days and years simply to copy that which others had prepared.

The invention of the movable type greatly facilitated the spread of knowledge. Constant improvements in printing even to this day have enabled man to acquire the printed word faster and cheaper. Now we have built up a tremendous number of libraries over the United States with their shelves loaded with books and magazines. No longer is it necessary for an Abraham Lincoln to trudge miles to a gracious friend's house and beg for a book.

Libraries can be filled with books which are useless unless they are read. The purpose of National Library Week is to get people to read. We now have the books but it seems we have become deplorably lazy in using them. Let's "Wake Up and Read!"

This reminds your editor of a situation in an isolated area during World War II. The area was a quiet sector so far as the shooting was concerned. Men grumbled because of the loneliness and the isolation. After considerable effort in procuring books from the United States a survey showed few of the books were read. The selections had been carefully chosen by a group of persons in

order to provide books to appeal to the majority. The greater interest, however, seemed to lie in the cheap comic magazine, rather than the good wholesome entertaining and educational books. Spare hours that could have been devoted to reading were wasted.

Now we have arrived at a situation in the United States where our spelling is poor, our grammar is as bad, and our reading habits have deteriorated. It is time to take an inventory of ourselves and correct some of these errors.

A visit to a library during the week of March 16-22 can be an awakening in the use of books to improve our reading habits. Maybe we can get students to learn how to use a dictionary and some of the standard reference works. How many are there who do not even know how to use a dictionary!

Many libraries were started years ago by men of vision—men who saw the value of collecting the written word for others. Notable among these men in medical circles was John Shaw Billings, a medical officer of the U. S. Army, "Father of the Army Medical Library." First known as the Surgeon General's Library, then the Army Medical Library, later as the Armed Forces Medical Library, and now as the National Library of Medicine, this institution has become one of the largest medical libraries in the world. It passed from control of the military forces on October 1, 1956 but its importance shall always be remembered as being initiated by the U. S. Army Medical Department.

The National Medical Library is greatly in need of a respectable, modern fireproof and bomb-proof building. Is the Nation ever going to provide it? How much longer are we going to quibble over design, location, and appropriation? Shall we allow enemies, be they men or weather, to destroy this valuable collection of books to which the eyes of the world turn for medical reading?

For Your Protection

GENERALLY we give little considered thought to the quality of the food we buy, or even the medicines we take. Rather we look at the price tag and make a hasty evaluation of the article. But even though we would like to study quality what would be the criteria that we would set up for the various items? It is not possible for each one of us to see how items are manufactured and then follow along the various routes that the items take until they get on the shelves of the retailer. Nor is it possible to delve into the many books and magazines on the subject. We must rely on the manufacturer who is interested in his product to turn out a high quality article for the price we can pay. Manufacturers who want to stay in business have this very concern for us.

To protect us from the unscrupulous manufacturer and retailer of food and drug products we have for our protection the Food and Drug Administration of the Department of Health, Education, and Welfare with

offices located near the Capitol in Washington, D.C. The eagle eyes and sensitive ears of that administration resulted recently in court action and fines for such things as: food stored in a warehouse infested with rodents, misbranded candy bars, inaccurate clinical thermometers, drug sales without a physician's prescription. The inspections are constantly going on to ferret out such practices.

This surveillance has not always been existent in the United States. As a result of the hard work of a man by the name of Harvey Washington Wiley, a Hoosier physician and chemist, Congress provided legislation in the early part of this century which led to the Food and Drug Administration in the Department of Agriculture. In recent years this administration has been transferred to the Department of Health, Education, and Welfare. Dishonest producers of food and drug products now know that they have some restraint put upon them; the honest producer has nothing to fear. This is Uncle Sam's way of saying, "Don't tamper with the health of my people."



AERO MEDICAL ASSOCIATION MEETING

HOTEL STATLER, WASHINGTON, D.C.

MARCH 24, 25, AND 26

(See page 226)

Around the World

(Ser. II, No. 19)

By

CLAUDIUS F. MAYER, M.D.

SALAMA in Uganda is the site of the first *International Demonstration and Research Center for the Rural Blind*, established on 30 acres of land, near the shores of Lake Victoria. Under the stimulation of Sir Clutha Mackenzie, a World War II blind veteran, this center came about with the following consideration. According to a rough estimate, there are about *ten million blind people* all over the world. Many of them are poor, illiterate peasants. In Africa alone, there are about a million blind persons. The western methods of blind welfare (Braille education, etc.) were not very successful in making the life of these people tolerable. Some of them returned to their rural occupations, thereby showing that blind welfare must be built upon and around the indigenous culture which alone can bring happiness to these unfortunates. At Salama, the blind African peasants are instructed in the kind of agriculture practiced in Uganda. They are re-trained and reoriented in life and living, with due regard to their family and community background. The *Salama center* started in September 1956. It also serves as a center for the study of the new type of training. It is hoped that similar centers can be established in Indonesia (800,000 blind persons), in Pakistan (338,000 blind), and elsewhere for the rehabilitation of blind peasants.

Italians are gradually withdrawing from the administrative management of the *affairs of Somaliland*; quitting their places for native talents. This "Somalization" will continue until the Somalis reach full independence. The colonial public-health authorities are fighting against the most wide-spread diseases such as malaria, tuberculosis, tumors, and venereal diseases. The health service is at present adequate. For the prevention of smallpox, more than 300,000 people were

inoculated in 1954, mostly free of charge. The total area of Somaliland is 461,541 sq. kms., with a total of 1,263,584 inhabitants scattered in 1,631 villages and towns. The number of resident Italians was 4,669 at the beginning of 1956. The country is essentially agricultural. There are as many camels and dromedaries, and twice as many goats as human inhabitants in Somaliland.

At one time or another, quite a number of medical people have served as *ship's surgeons*. Medical service on *British ships* is regulated in modern times. The rules require that each foreign-going vessel must employ a doctor if there are one hundred or more persons aboard, or 50 or more steerage passengers. At present, there are 300 British ships carrying a regular ship surgeon. These medical positions in the Merchant Navy are three types: (1) regular surgeons on large passenger liners who are in a more or less permanent position; (2) surgeons under long-term contract on cable ships, whalers, exploratory expeditions, etc.; (3) casual surgeons employed on secondary liners for fairly long voyages.

A ship surgeon is now the only real general practitioner left in Britain, as one of them (A. Duff) tells us. Though medical practice is fairly well covered by internal medicine, surgery is also quite well provided nowadays, judging from the long list of surgical instruments available in the ship's dispensary. The most important medical reference work is *The Ship Captain's Guide*, worthy of reading even by a medical doctor. The work thoughtfully includes also, at its end, a short form of the burial service approved by the Archbishop of Canterbury. A good polyglot medical questionnaire is also handy. The fate of the future medical service on British ships is now in the hand of the planners some of whom would like to make

the Merchant Navy a branch of the National Health Service.

Not many of us may know about those other "ship's doctors" who rarely go to sea. They are members of a wonderful organization which the British established for free medical service of their small vessels. This service, called MEDICO by the code word, also helps foreign vessels. It includes the following elements. Each British captain has an expertly designed medicine chest, and the above mentioned simple Medical Guide supplied by the Ministry of Transport. The ship also has a radio by which it can call for an expert and instant medical advice if it is within 300 miles of the British coastline. The British Post Office and the Ministry of Health maintain a 24-hour listening on a chain of radio stations around the shores of Britain. The stations are in direct contact with hospitals and doctors who have given detailed and wonderful advice in a number of complicated cases. Thousands of sailors owe their recovery, even their lives, to MEDICO.

Ever since 1555, when a London merchant brought back five "black slaves," there have been colored workers in England. Since 1950, most of them have been coming from the West Indies. At the end of 1955, there were about 100,000 colored workers in Great Britain (57,000 from the West Indies, mostly from Jamaica, and ca. 40,000 from India and Pakistan); 40% of these migrants are in London, and the rest are scattered in such settlements as the Balsall Heath in Birmingham, the Moss Side in Manchester, etc. The recent increase in the immigration from the West Indies is due to the fact that West Indians are now barred from the United States by the McCarron Act. This increase causes crowded housing conditions, and it endangers the health of the people of Great Britain, as was recently explained to the Royal Society of Health (by Skone). Approximately 70% of the landladies in London were found to be unwilling to accept colored students, especially dark Africans and West Indians. If one of the colored persons wants to buy a house, he can buy one only in an

already deteriorated section of the town. Many of the West Indians, especially, cannot find such respectable clerical jobs in England as they used to hold in the West Indies, and they have to be satisfied with unskilled labor. Many of them cannot stand the climate, and do not know that the lack of sunshine in England has to be compensated for by supplementary vitamins. *Great Britain has its "colored problem"* the solution of which is not easy since only one-third of the British people are tolerant of colored people, another third are mildly prejudiced and one-third are extremely prejudiced. It is more and more evident that England has to regulate its immigration, and to adopt a policy of medical control. At present, almost 70% of the colored immigrants enter the ports without any real medical checkup.

In Mexico, the staff of the *Central Military Hospital* is continuously trained in methods of *rescue in high mountains*. There is a practical exercise every month in the mountains where the staff receives instruction in the transportation of the wounded from the realm of perpetual ice and snow. The site of many such exercises is the Popocatepetl volcano which is 5,450 m. above sea-level. Another favored site of the rescues is over the Alferez waterfalls, in the region of Salazar and the Rio Hondito.

The 1957 award of the *Nobel Prize* in medicine and physiology was given to Daniel BOVET for his research on sulfonamides, antihistamines and muscle relaxants. Bovet, born in 1907 in Neuchâtel, Switzerland, is a naturalized Italian. After his graduation at the University of Genève, he became the associate of Fourneau, the pharmacologist of the Pasteur Institute at Paris. In 1947, Bovet became the director of the Pharmacology Department of the *Istituto Superiore di Sanità* at Rome. His researches led to the application of succinyl-choline in modern anesthesia as a muscle relaxant. His present studies are concentrated on the effect of the tranquilizers. The *Nobel Prize of Chemistry* went to Sir Alexander TODD (1907) for his work on nucleotides and nucleotide co-

enzymes. He is professor of organic chemistry at Cambridge. He showed that vitamin B₁₂ is a nucleotide, with its basic structure resembling that of the hemoglobin and the porphyrins.

The usual annual *conference of the Nobel Prize winners* was held last July at Lindau, Lake Constance, in the City Theater. Those present made a long list of famous names. Hench, of Rochester, discussed the chemical and experimental uses of cortisone which he discovered some years ago. Forssmann's address was on cardiology. Stanley, of Berkeley, analyzed the relation of virus and cancer. Hevesy, of Stockholm, talked of anemia in cancer. Domagk, of course, had a topic related to chemotherapy, while Waksman showed the social significance of antibiotics. Theorell, of Stockholm, read a paper on respiratory enzymes. And so on. The meeting at Lindau was of great interest to physicians this year.

Among the recent *international losses of medicine* we mention Gerty T. CORI (1896-26 Oct. 1957) who shared the award of the 1947 Nobel Prize for medicine and physiology with her husband. She died at St. Louis, Mo., where she was a biochemist. Her discovery was related to the mechanism of the catalytical conversion of glycogen. Another recent loss is the death of the nestor of industrial physicians, Ludwig TELEKI (1872-Aug. 20, 1957), an Austrian by birth, later medical inspector of the factories in the Rhineland. Later, at the time of the Nazi persecution of the Jews, he sought refuge in the United States where he worked in the New York Department of Industrial Hygiene. He wrote the "History of Factory and Mine Hygiene" (1948). Prof. Heinrich ZANGGER (1874-1957), Swiss forensic medical expert, was especially interested in industrial toxicology. In 1929, together with Teleki, he founded the *Archiv für Gewerbe-pathologie*, which he edited almost until his death. Other notable physicians who died recently are Sir John PARSONS (1868-Oct. 7, 1957), British ophthalmic surgeon, and Ludwig NÈKÀM (1868-1957), grand old

man and professor of dermatology in pre-Communist Hungary.

Among all the factors that influence the human body of the *workers at radar stations*, the most harmful effect is attributed to *noise*. Examinations of Russian military surgeons showed that, in the radar operators and in those who were servicing the generators, a few hours of continuous work would cause a loss in hearing capacity which might vary from 5 to 30 decibels. This loss is caused by the continuous noise that results from the noise of the ventilators, feeding blocks, electric apparatuses, loud talk of the operators, etc. When measured, this noise was found to exceed 75 decibels, the average threshold of the injurious effect of noise. As a consolation, radio operators should know that in 2-4 hours after finishing their daily work their hearing will return to normal; yet, those who had been working for many months may find a permanent loss of hearing for the middle and the high frequencies.

The October 1957 issue of the Russian Military Medical Journal is devoted to the *appraisal of 40 years' advances in the "socialistic" republic of the Soviet Union*. In a leading article, the progress is demonstrated by comparing the present status of Russia partly with the 1917 conditions in Tzarist Russia and partly with the conditions in similar lines of the national life in the United States of America. After a glorification of Lenin and a condemnation of such anti-Communists as the recently purged members of the Presidium (Zhukov is not mentioned among them), we are told that "socialism" (i.e. communism) has now spread to many countries in Europe and Asia, aside from China. Today, the "socialist" camp includes 26% of the surface of the globe, embracing about 35% of the world's population and almost one third of the world's industrial production. Many are the claimed benefits of the communistic regime whose working principle is "Who does not work should not eat." In comparison with the 1917 level, the industrial production of Russia increased 33 times, and the efficiency of industrial pro-

ductivity increased 74 times. The machine industry and metallurgy in 1957 were 200 times above the 1917 level. In 1917, Russia produced 13-14 times less bathing equipment than the U.S. Now, the difference is much less (only 2.6 times more bathing equipment in the U.S.). The payment of the workers, and the cultural level of the Russian people also have been increased since 1917. Now, four million persons are trained in technics, while in 1917 the number of students was only 182,000. At the institutions of the various academies of science, 240,000 workers are engaged in science. The high level of science is shown by the launching of the intercontinental ballistic missile and the experimental Sputnik ("Satellite") of the earth. Great improvements came also in the field of medicine. Counting their blessings, the Russians say that in Tzarist Russia the number of high medical institutions was only 17, with 1,500 doctors. Now, there are 77 institutions for the teaching of public health, with a student enlistment of 150,000. Every year, these institutions graduate 25,000 doctors. It is further stated that the Russian pharmaceutical industry manufactures 70% of the country's medicaments, and the metal industry produces 9/10 of the medical and surgical instruments. As the great test of Soviet medicine the Second World War is held out, and the military surgeons proudly claim that they successfully rehabilitated and placed in useful work 88.3% of their disabled war veterans.

The truth of such claims is difficult to ascertain, partly because until quite recently most of the Soviet statistical data were given in percentages only. Last Spring (in May 1957), the *Central Statistical Bureau for the Soviet Ministers* of the USSR published a small booklet, however, entitled "National Economy of the USSR in the Year 1956" in which, in addition to the percentages, we also find tangible figures. A special chapter of the book reveals the *status of public health in the Soviet economy*, with appropriate reference numbers from Pre-Revolutionary Russia. It is interesting to see that, though the rates of

natality and mortality were higher in 1913 (47.0 pro mille, and 30.2 p.m.) than in 1956 (25.0 and 7.7), yet the rate of net increase in population remained almost constant throughout the decades (16.8 p.m. in 1913; 17.3 p.m. in 1956). At the same time the duration of life almost doubled. In 1896, the life of a Russian could be expected to last 32 years only; now, the Russian man has 61, and the Russian woman 67 years in prospect.

In 1956, Soviet Russia employed 2,780,000 persons in public health work, not to count those in the military services. In the same year the country had 329,000 physicians, and 25,000 dentists of whom 75%, or a total of 246,700, were women. What a great difference from 1913 when, according to the official booklet, the number of physicians did not exceed 24,000! Let us add here that in the month of April 1956 the official count of the population in Soviet Russia reached 200,200,000 of whom 156,700,000 were living in the European part of the Soviet Union.

It is reported from Japan that the *rusting of iron* is a more complicated process than we formerly thought and that various bacterial types also contribute to the initiation of chemical changes. This led to the idea of preventing rusting by the use of *bactericide and antibiotic substances*. The Japanese showed that a spirochaete-containing water in which razor blades would quickly turn rusty can be effectively neutralized by the addition of arsphenamine or penicillin. Maybe this observation can be further exploited industrially and medically.

Alcoholism is spreading in Canada. According to recent estimates there are some 180,000 alcoholics in that country, most of them in the group of skilled or semiskilled persons, between the ages of 35 and 45 years, usually people who own their homes. In percentages the rapid increase is shown so that in 1943 there were 1,240 alcoholics for every 100,000 Canadian adults; in 1956 there were 1,850 alcoholics in the same size of population.

In May 1957, the *South Rhodesian Parlia-*

ment passed a new *Liquor Act* which now permits Africans to buy European beer and wines. Suddenly, the sale of beer jumped to £6,000 a week in Salisbury (in Harari) alone, and the beer-halls, which resemble enormous cow-pens, were put in maximum disorder by the Africans. The town of Bulawayo reported selling about £2,500 worth of European beer to Africans weekly. This amount of money used to be spent on food and clothing; now, many African families

will go more ragged and starving. Someone recently added a strange provision to the abused Liquor Law, hoping to eliminate the evils. A *university degree* is now the prerequisite for an African wanting a permit to buy alcohol in Southern Rhodesia. Perhaps, as the interested persons expect, the local University College will also come up with a new course teaching the population how to Master the Art of Drinking. . . . *Multa Paucis!*



SURGEON, USAFE



U. S. Air Force Photo

(L to R) Brig. Gen. Harold H. Twitchell; Col. William H. Cook, Deputy Surgeon; Col. Thomas H. Crouch, Commander, 7100th USAF Hospital; Col. William M. Johnson, Dir. of Plans and Hospitalization.

Brig. General Harold H. Twitchell is the new Surgeon for the United States Air Forces in Europe, the headquarters for which are at Wiesbaden, Germany. General Twitchell assumed the new duties on February 1, succeeding Major General Harry G. Armstrong in that position.

Prior to this assignment General Twitchell was Surgeon for the Continental Air Command, Mitchel Air Force Base, New York.

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It is a privilege to list the firms who have joined The Association of Military Surgeons as Sustaining Members. We gratefully acknowledge their support.

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The Sir Henry Wellcome Medal and Prize

COMPETITION FOR 1958

THE competition is open to all medical department officers, former such officers, of the Army, Navy, Air Force, Public Health Service, Veterans Administration, The National Guard and the Reserves of the United States, commissioned officers of foreign military services, and all members of the Association, except that no person shall be eligible for a second award of this medal and prize and no paper previously published will be accepted.

The award for 1958, a medal, a scroll, and a cash prize of \$500, will be given for the paper selected by a committee composed of the Association's vice-presidents which reports on the most useful original investigation in the field of military medicine. The widest latitude is given this competition, so that it may be open to all components of the membership of the Association. Appropriate subjects may be found in the theory and practice of medicine, dentistry, veterinary medicine, nursing and sanitation. The material presented may be the result of laboratory work or of field experience. Certain weight will be given to the amount and quality of the original work involved, but relative value to military medicine as a whole will be the determining factor.

Each competitor must furnish six copies of his paper which must not be signed with the true name of the author, but are to be identified by a *nom de plume* or distinctive device. These must be forwarded to the Secretary of the Association of Military Surgeons of the United States, Suite 718, 1726 Eye St. N.W., Washington 6, D.C., so as to arrive at a date not later than 1 July 1958, and must be accompanied by a sealed envelope marked on the outside with the fictitious name or device assumed by the writer and enclosing his true name, title and address. The length of the essays is fixed between a maximum of 10,000 words and a minimum of 3000 words. After the winning paper has been selected the envelope accompanying the winning essay or report will be opened by the Secretary of the Association and the name of the successful contestant announced by him. The winning essay or report becomes the property of the Association, and will be published in *MILITARY MEDICINE*. Should the Board of Award see fit to designate any paper for "first honorable mention" the Executive Council may award the writer life membership in The Association of Military Surgeons, and his essay will then also become the property of the Association.

ASSOCIATION NOTES

Timely items of general interest are accepted for these columns. Deadline is 3rd of month preceding month of issue.

Department of Defense

Ass't Secretary (Health & Medical)—HON. FRANK B. BERRY, M.D.

Deputy Ass't Sec'y—HON. EDW. H. CUSHING, M.D.

SELECTIVE SERVICE

Under the doctor-draft law which was in force from 1951 to June 30, 1957 the Armed Forces requisitioned 12,031 physicians, 4,960 dentists, and 118 veterinarians.

Army

Surgeon General—MAJ. GEN. SILAS B. HAYS

Deputy Surg. Gen.—MAJ. GEN. JAMES P. COONEY

FLAG OFFICER TRANSFERS

Major General John F. Bohlender who has been Commanding Officer of Tripler Army Hospital in Hawaii has been transferred to Denver, Colorado, where he will command Fitzsimons Army Hospital.

Brig. General Jack Schwartz has been transferred from Madigan Army Hospital to Hawaii.

Brig. General Thomas J. Hartford who has been Deputy Commanding General of the Walter Reed Army Medical Center, Washington, D.C., has been transferred to Madigan Army Hospital as its Commanding Officer.

GENERAL YOUNG HONORED

At a recent meeting of the District of

Columbia Veterinary Medicine Association Brig. General Elmer Young, Chief of the Army Veterinary Corps was elected president for 1958. Other officers elected were: Dr. Erven Ross, a Washington practitioner, 1st vice-president; Dr. Robert Byrne, University of Maryland faculty member, 2nd vice-president; and Dr. William I. Gay, National Institutes of Health, secretary-treasurer.

The membership of this group includes veterinary doctors in federal and state government, the military services, commercial organizations, private practice, and educational institutions.

SGO ASSIGNMENTS

Lt. Col. Richard B. Austin III, MC, has been appointed Chief of the Aviation Branch in the Office of the Surgeon General. He will coordinate all Army aviation medicine activities and maintain liaison with Army agencies, with the Air Force and the Navy, and the civil aviation medicine authorities.

Captain John O. Williams, MSC, has been assigned to the Office of the Surgeon General as Chief of the Field Service Section in the Maintenance Branch of the Supply Division.

This section takes part in the estimate, review and justification of all budgets prepared in the Army Surgeon General's Office relating to medical maintenance activities, and it reviews and analyzes reports of field maintenance activities on medical equipment used by the Department of the Army.

GIVES LECTURE

Brig. Gen. Sam F. Seeley, Chief of the Professional Division, Office of the Surgeon General made two addresses recently at the University of Minnesota in Minneapolis during a Course in Emergency Surgery for the General Physician.

The topics of his talks were: "Debridement of Wounds" and "Management of Vascular Injuries." He stressed the points that there should be wide exposure, complete debridement and delayed closure of wounds in case of mass casualties.

LECTURES IN SANTO DOMINGO

Colonel Joseph L. Bernier, Chief of the Dental and Oral Pathology Branch of the Armed Forces Institute of Pathology was one of four dental surgeons who delivered a series of lectures at the University of Santa Domingo recently. Others were Harry Seldin, Saul Misheloff, and Charles C. Berger, all of New York City.

Colonel Bernier also addressed the Armed Forces dental officers of that country on "Problems of Oral Pathology Peculiar to Military Activities."

BOVARD AWARD

The first Evangeline G. Bovard Award was presented to Captain Lenora B. Wierick, ANC, Letterman Army Hospital by its founder Colonel Robert Skelton, retired medical officer of the Army, at that hospital on January 14.

Colonel Skelton, who was commissioned

in the Army Medical Corps in 1911, married Evangeline Bovard, an Army Nurse, in 1917. She had served in the Army Nurse Corps from January 1912 until February 1916, and from July 1916 until August 1917. She died at Letterman Army Hospital December 29, 1955 and was buried in Golden Gate Cemetery, Presidio of San Francisco.

The Bovard Award was made possible by the setting aside of \$25,000 by Colonel Skelton. The recipient will be the nurse (or nurses) demonstrating the highest degree of professional competence in maintaining the superior standards of the Army Nurse Corps.

The winner of the 1957 Bovard Award was commissioned in the Army Nurse Corps during World War II. She served with a front line field hospital in Germany. During the Korean Conflict, Captain Wierick received the Bronze Star for tireless devotion to duty while serving in the forward areas with a Mobile Surgical Hospital. During her assignment at Letterman, Captain Wierick has demonstrated her nursing skills in the care of paraplegic and acutely ill patients, aiding immeasurably in their rapid recovery. She recently has been attending the University of San Francisco under the Army's Final Semester Plan and will receive her B.S. degree in nursing in June. Her next duty station will be Germany.

COLONEL SKELTON RECEIVES CERTIFICATE



U. S. Army Photo

(L to R) COL. ROBT. SKELTON, COL. CLAUDE C. BRITELL, COL. LOUIS E. MUDGETT, BRIG. GEN. PAUL S. FANCHER.

CAPT. LENORA B. WIERICK, ANC



U. S. Army Photo

Following the presentation of the first Bovard Award by its founder, Colonel Robert Skelton, he was presented with the 40-Year Certificate of Membership to the Association of Military Surgeons by Brig. General Paul S. Fancher, the Commanding General of Letterman Army Hospital.

As stated in a letter from General Fancher, "The presentation of the certificate came as a complete surprise to Colonel Skelton and the assembled guests, and was more than a fitting climax to the entire afternoon."

DENTAL SURGEON—EIGHTH ARMY

Colonel Charles M. Farber, formerly Chief of the Dental Service at Brooke Army Hospital, has been assigned as Dental Surgeon of the Eighth U. S. Army in Korea. Upon leaving Brooke Army Hospital he was presented with a certificate of achievement by Major General Stuart G. Smith, the Commanding Officer.

HIGH SPEED DENTAL EQUIPMENT

DEMONSTRATION

By means of a closed circuit color telecast viewers at Northwestern University in Chicago were able to see the newest in high speed dental equipment demonstrated recently at the Armed Forces Institute of Pathology in Washington, D.C.

The broadcast was narrated by Colonel Joseph L. Bernier, Chief of the Dental and Oral Pathology Section at the Institute. He was assisted by Capt. Milton J. Knapp, senior resident in oral pathology, and Captains Fred L. Adelson and Robert D. Jeronimus who are assigned to the Dental Clinic at Walter Reed Army Hospital.

In Chicago, the moderator was Dr. Richard Tiecke, professor at Northwestern University Dental School. He is a former officer of the Army Dental Corps.

CONSULTANT

Lt. Col. Agnes P. Snyder, Chief of the Physical Therapist Section, Army Medical Specialist Corps, will be consultant in human relations for the joint training institute to be held by the American Physical Therapy Association and the U. S. Department of

Health, Education and Welfare at the University of Oklahoma, Norman, Oklahoma, March 24-28.

The institute has been arranged particularly for physical therapy teachers and physical therapists associated with the affiliating clinics of the schools. More than 80 participants will be present, one from each of the nation's approved schools of physical therapy and one from each of their affiliating clinics.

U. S. LADY-OF-THE-YEAR

Lt. Colonel Ruby G. Bradley, ANC, now serving as chief nurse of the Third Army at Ft. McPherson, Georgia, was named U. S. LADY-of-the-Year by *U. S. LADY*, a national magazine for service wives, service women and service families.

The colonel is the first woman in uniform to be chosen for that honor. She is the Army's "most decorated" nurse, who was a prisoner of the Japanese for 37 months during World War II and later served as the Eighth Army's chief nurse in Korea.

Colonel Bradley joined the Army Nurse Corps in 1934. In 1940 she was sent to the Philippines and was at Camp John Hay in Baguio when the Japanese overran the Philippines in 1941. During her 37 months and 5 days as prisoner she continued nursing. When the Korean Conflict broke out she volunteered for combat duty and within a month was on her way to Korea with the 171st Evacuation Hospital.

Colonel Bradley's home town is Spencer, West Virginia. She is a graduate of the Philadelphia General Hospital School of Nursing, and in 1949 received her B.S. degree in Nursing Education from the University of California, under the Army program of education. She holds the Florence Nightingale Medal of the Red Cross, and the Commendation Ribbon with medal pendant as well as more than a dozen other campaign ribbons, including Korean and Philippine Independence ribbons.

FORMER DIVISION SURGEON WRITES MARCH

Lt. Colonel Edward S. Brewster, former division surgeon of the 4th Armored Division, has written a military march, *Tankers*

Break Through. The march, "strictly GI" as Colonel Brewster states, has been copyrighted and dedicated to and accepted by the Fourth Armored Division.

Colonel Brewster is now a busy physician specializing in internal medicine in Danville, Illinois.

REUNION

The World War II veterans of the 134th Evacuation Hospital will hold their 14th annual reunion dinner March 22 at the Fort Lesley J. McNair Officers Club, Washington, D.C.

Colonel James H. Kidder, former commander of the hospital, is now on duty in Washington as Special Assistant to the Surgeon General of the Army for Reserve Forces.

FIRE-FIGHTER'S SUIT

An aluminized suit for fire-fighters has been tested on a large size scale by the 34th Engineer Battalion at Fort Lewis, Washington. These suits are made of flame retardant treated aluminized kraft paper and each suit consists of a parka with hood, a face mask, a pair of leg sleeves, and a pair of mittens.

Reports indicated that in the tests the soldiers could stand within two feet of a forest fire for two or three minutes without discomfort even though the heat was so intense it blistered exposed portions of their helmet liners.

Related tests at the same time proved the feasibility of an emergency water supply system which was made up of lightweight piping and hose, together with an electrically driven submersible pump. The light weight hose was laid successfully by a helicopter flying at tree-top level.

OVERSEAS SERVICE

Four out of every ten American soldiers are overseas in some 75 nations and other locations of the free world. *Army '57 Report*

ACCIDENTS

Army Director of Safety Thomas H. Wilkenson said that there was a record low in

the number of soldiers accidentally killed during the recent Christmas-New Year holiday in the Continental United States.

According to the Director's figures, 30 fatalities occurred during the 17 days starting on December 20, 1957 compared with 33 for the same period the previous year, and 43 two years ago.

Mr. Wilkenson credited personnel in the field for this improved record. The improvement is not limited to the holiday period. Mr. Wilkenson disclosed that "during the first 11 months of 1957 there were 62 fewer soldiers killed than during the same period in 1956."

Air Force

Surgeon General—MAJ. GEN. DAN C. OGLE
Deputy Surg. Gen.—MAJ. GEN. OLIN F. MCILNAY

COMMAND SURGEONS CONFERENCE

The United States Air Force Command Surgeons Conference was held in Washington, D.C., on January 23.

Major General Dan C. Ogle, Surgeon General of the Air Force, and members of his staff presented discussions on the structure, medical personnel, education, and physical standards goals of the future Air Force. Each Command Surgeon reported on medical facilities under his jurisdiction.

Those in attendance, other than headquarters personnel were: Maj. Gen. Otis O. Benson, Jr. (Commandant of the USAF School of Aviation Medicine); Col. Hayden Withers (representing the Surgeon of the Air Research and Development Command); Brig. Gen. Harold H. Twitchell (then Surgeon of the Continental Air Command, now Surgeon USAFE); Brig. Gen. Robert E. Lee (Surgeon of the Tactical Air Command); Brig. Gen. A. H. Schwichtenberg (Surgeon of the Air Defense Command); Brig. Gen. Wilford F. Hall (Surgeon of the Air Materiel Command); Brig. Gen. Loyd E. Griffis (Surgeon of the Strategic Air Command); Col. James G. Moore (Surgeon of the Air Training Command); Col. Walter A. Carlson (Surgeon of Air Univer-

sity); Col. Aubrey L. Jennings (Surgeon of Headquarters Command); Col. L. Render Braswell (Surgeon of Military Air Transport Service); Col. Fratis Duff (Commander of Gunter Branch, USAF School of Aviation Medicine); Col. Howard F. Currie (Chief of the Arctic Aeromedical Laboratory); Col. Jack Bollerud (Chief of the Aero Medical Laboratory at Wright-Patterson Air Force Base); Col. Arthur H. Corliss (Surgeon of the First Air Force); Col. Lloyd Gould (Surgeon of the Fourth Air Force); Col. John Booth (Surgeon of the Fourteenth Air Force); Col. Raymond T. Jenkins (Surgeon of the Eighteenth Air Force); Col. Nicholas Atria (Surgeon of the Ninth Air Force); Maj. W. W. Sheppard (representing the Surgeon of the Tenth Air Force); Col. Ralph E. Switzer (Surgeon of the Central Air Defense Force); Col. Robert A. Patterson (Surgeon of the Eastern Air Defense Force); and Col. Benjamin Strickland (Surgeon of Technical Training Air Force).

DENTAL CHIEF

Brig. General James S. Cathroe, USAF (DC), who has been Deputy Assistant for Dental Services in the Office of the Surgeon General, U. S. Air Force, since 1955, was



Official U. S. Air Force Photo

BRIG. GEN. JAMES S. CATHROE

appointed as Assistant for Dental Services, effective February 1, 1958.

General Cathroe succeeds Major General Marvin E. Kennebeck, USAF (DC), who retired on January 31, and will remain in the Washington, D.C., area temporarily.

The new dental chief is a native of Omaha, Nebraska, and received his Doctor of Dental Surgery degree from Creighton Dental School in 1928. He entered on active duty with the Army that year and served his internship at Letterman General Hospital in San Francisco. In July 1949 he transferred to the Air Force where his assignments have included duty as Command Dental Surgeon of the Eastern Flying Training Command, Caribbean Air Command, and the Air Training Command.

HUMAN BODY STRESS AND FATIGUE

A bibliography compiled for the Air Force as the first step in an experimental investigation of the effects on air crews of relatively long confinement inside an advanced design aircraft has just been released to the public.

The publication contains 883 references and a topical index. It is PB 131299 *Selected Bibliography: Fatigue, Stress, Body Change and Behavior*, W. Bevan and R. M. Patton, Lockheed Aircraft Corp. for Wright Air Development Center, U. S. Air Force, April 1957. The volume may be ordered from OTS, U. S. Department of Commerce, Washington 25. It contains 69 pages, price \$1.75.

Navy

Surgeon General—REAR ADM. BARTHOLOMEW W. HOGAN

Deputy Surgeon General—REAR ADM. BRUCE E. BRADLEY

ASSIGNMENTS

Rear Admiral Edward C. Kenney, MC, who has been Commanding Officer of the U. S. Naval Hospital, National Naval Medical Center, Bethesda, Maryland, has been assigned as Assistant Chief of the Bureau of Medicine and Surgery for Personnel and Professional Operations.

Rear Admiral French R. Moore, MC, has been transferred to the Fifth Naval District with headquarters at Norfolk, Va. He will assume the duties of District Medical Officer.

Rear Admiral Irwin L. V. Norman, MC, succeeds Admiral Moore in the position of Inspector General Medical in the Bureau of Medicine and Surgery.

RADIOISOTOPE BRANCH—NAVAL DENTAL SCHOOL

The U. S. Navy Dental Corps is faced with dental health and environmental problems that can be solved only by intensive clinical and laboratory investigation. Many of these investigations will be pursued within the "Nuclear Age" program of the U. S. Navy. Supervision of clinical and laboratory studies pertaining to dentistry will be under the direction of a newly established Radioisotope Branch at the U. S. Naval Dental School, National Naval Medical Center, Bethesda, Maryland. The installation of a nuclear reactor at the National Naval Medical Center makes possible for the first time in the history of dentistry, the production of short half life radioisotopes locally, in close proximity to the patients in whom they may be used. Having this facility available in the Medical Center will open up an entirely new field in the utilization and investigation of radioactive isotopes of short half life, which will provide the same diagnostic information as the longer half life isotopes without subjecting the patients to excessive amounts of internal body radiation.

Public Health Service

Surgeon General—LEROY E. BURNEY, M.D.
Deputy Surg. Gen.—JOHN D. PORTERFIELD, M.D.

APPOINTMENT

Dr. Leslie W. Knott has been appointed Assistant Chief of the Division of Special Health Services, Bureau of State Services, Public Health Service. He succeeds Dr. Elton S. Osborne who has been named Deputy Chief of the Division of Personnel.

The Division of Special Health Services includes Public Health Service activities in the fields of chronic disease and aging, tuberculosis, heart disease control, occupational health, air pollution (medical area), radiological health, cancer control, and accident prevention.

TO ODM

Dr. Max M. Van Sandt, a Public Health Service medical officer who has been on detail to the Federal Civil Defense Administration, has been assigned to the Office of Defense Mobilization. His official position in that office will be Chairman of the Health Manpower Task Force.

Dr. Van Sandt, a native of Oklahoma, received his medical degree from the University of Cincinnati in 1930 and then entered private practice in Oklahoma until 1945 when he entered the Federal service with the Bureau of Indian Affairs. In 1948 he was commissioned in the Regular Corps of the Public Health Service.

PROMOTED

Dr. James R. Shaw, Chief of the Public Health Service's Division of Indian Health, has been promoted to the grade of Assistant Surgeon General with a rank equivalent to that of rear admiral.

Dr. Shaw has headed the Federal Government's program for Indian Health since July 1953. His responsibility includes the administration of the medical and public health services for approximately 380,000 American Indians and Alaskan Natives, with a health staff of 4,500 physicians, dentists, nurses, sanitary engineers, medical social workers, and other administrative and technical personnel.

ACTIVE DUTY ASSIGNMENTS

Physicians who have Selective Service obligations to fulfill can meet them by serving two years active duty in the Commissioned Corps of the Public Health Service. Immediate active duty assignments are available for those who qualify for appointment.

The majority of assignments given to physicians in the Public Health Service are in

clinical medicine but a limited number are available in research, and preventive medicine and public health.

Inquiries concerning careers in the Public Health Service or two years of active duty to satisfy Selective Service obligations should be directed to the Surgeon General, U. S. Public Health Service (P), Washington 25, D.C.

RETIRED

Medical Director Maurice A. Roe, who was stationed at Dallas, Texas, as Public Health Service Regional Medical Director recently retired from the Public Health Service.

THE AGING POPULATION

The Surgeon General, Dr. Burney, recently stated that, "the number of people 45 and over has increased 3½ times (since 1900). Today, more than 40 million people—approximately 30 percent of the total population—are in this age group. By 1970 their number is expected to increase to 61 million. Moreover, 40 percent of the chronically ill in this country are persons 65 years of age and over, of whom there are now 14 million in the United States."

AIR POLLUTION CONFERENCE

A national conference to study the growing problem of air pollution in urban areas has been called on the recommendation of Dr. Leroy E. Burney, Surgeon General of the Public Health Service. The date has been tentatively set for the week of November 15 in Washington, D.C.

The purpose of the conference will be to bring together leading authorities to consider the many legal, medical, industrial problems involved and to pool the experience already obtained by such cities as Los Angeles, Pittsburgh, St. Louis, and others in combating air pollution.

Legislation enacted in 1955 authorized the Surgeon General of the Public Health Service to carry out a five-year program of research and technical assistance to the States on the growing air pollution problem.

VENEREAL DISEASE CONFERENCE

The 27th Annual National Venereal Disease Postgraduate Conference for physicians sponsored by the University of Texas Post-graduate School of Medicine, Baylor Uni-versity College of Medicine, Texas State De-partment of Health, and in cooperation with the Texas Medical Association and the Public Health Service, will be held at the University of Texas, M. D. Anderson Hos-pital and Tumor Institute, Texas Medical Center, in Houston, Texas, April 23-25, 1958.

Twenty hours of credit will be certified for those members of the American Academy of General Practice in attendance. No tuition fee will be charged; however, for those desiring Category I credit, a \$5.00 Registrar's fee will be charged.

The Conference is designed to acquaint the practitioner with the latest developments in diagnosis, treatment, management, and control of the venereal diseases. Applications for admission are to be sent to Dr. Grant Taylor, University of Texas Postgraduate School of Medicine, Houston, Texas.

MEDICAL RESEARCH

Research grant programs of the National Institutes of Health, the principal research arm of the Public Health Service, have been increased almost three times since fiscal 1955. The total funds available to the Institutes in 1958 for research, training, and related ac-tivities are more than double the 1956 appropria-tions. The 1959 budget provides for some internal adjustments among the eight appropriations concerned; however, total funds would equal the 1958 appropriations.

Amounts requested for 1959 and funds available for the current year for each of the accounts as follows:

| | 1958 | 1959 |
|--|---------------|---------------|
| General research and services | \$ 14,026,000 | \$ 17,742,000 |
| National Cancer Institute | 56,402,000 | 55,923,000 |
| Mental health activities .. | 39,217,000 | 37,697,000 |
| National Heart Institute .. | 35,936,000 | 34,712,000 |
| Dental health activities .. | 6,430,000 | 6,293,000 |
| Arthritis and metabolic disease activities | 20,385,000 | 20,592,000 |

| | | |
|--|---------------|---------------|
| Allergy and infectious disease activities | 17,400,000 | 17,497,000 |
| Neurology and blindness activities | 21,387,000 | 20,727,000 |
| Total | \$211,183,000 | \$211,183,000 |

SUPPLEMENT AVAILABLE

Survey of Compounds Which Have Been Tested for Carcinogenic Activity—Supplement I is now available at \$3.50 from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D.C.

The supplement lists 981 compounds which were tested during the period 1948 through 1953, of which 779 are reported for the first time.

Veterans Administration

Chief Medical Director—WILLIAM S. MIDDLETON, M.D.

Deputy Chief Med. Dir.—R. A. WOLFORD, M.D.

ASSIGNMENTS

Dr. Linus A. Zink will succeed Dr. Frank B. Brewer as assistant chief medical director for operations in the Veterans Administration upon the retirement of the latter on March 31.

Dr. Brewer has been with the Federal medical services since 1917 when he entered the Army Medical Corps. He transferred to the Veterans Bureau (now Veterans Administration) in 1921 from the United States Public Health Service which he joined after his military service in World War I.

Dr. Zink is a native of West Carrollton, Ohio and received his medical degree from Ohio State University in 1937. He was on active duty with the U. S. Army from 1940 to 1947 when he entered the VA service.

Dr. Prince P. Barker has been appointed as manager of the VA hospital at Tuskegee, Ala. He succeeded Dr. Toussaint T. Tildon who retired January 31.

Dr. Sam Beanstock has been assigned as manager of the VA hospital at Chillicothe, Ohio to succeed Dr. Harry H. Botts who retired January 11.

Dr. Russell L. Hiatt has been transferred to the Veterans Administration Hospital at Louisville, Ky., to be its manager. He has succeeded Dr. Harvey C. Hardegree who retired December 31, 1957.

Dr. Otto Schaefer has been transferred from Roseburg, Oregon, to the 1,729-bed neuropsychiatric hospital in Danville, Ill. He replaced Dr. Oreon K. Timm, who became director of the area medical office in St. Paul, Minn.

Dr. Michael H. Travers, formerly of the VA center at Kecoughtan, Va., has succeeded Dr. Hiatt as manager-director of professional services of the Fort Wayne, Ind., VA hospital. During World War II Dr. Travers served with the Army Medical Corps at Fort Jackson, S.C.

DENTAL INTERNSHIPS

An increased number of Veterans Administration dental internships and residencies has been approved by the Council on Dental Education of the American Dental Association.

The training will be conducted at 29 VA hospitals located in educational centers throughout the nation.

Students and graduates interested in these programs may apply to the manager of the VA hospital of their choice.

The internships and residencies will begin July 1, 1958. Internships are for a period of one year. Residencies are in prosthodontics, oral surgery, and periodontics and may be for one or more years.

OPPORTUNITIES FOR NURSES

Increased opportunities for advanced education and training now are offered nurses by the Veterans Administration.

The Veterans Administration said the opportunities include leave and financial assistance to selected nurses for attending universities, in addition to in-service training for management and supervisory positions, hospital training in nursing specialties, orientation programs for all nurses entering VA, and opportunity to attend nursing institutes and workshops throughout the nation.

VA nurses selected for university training may be provided tuition and salary, or salary only, or leave without pay, depending on the university program undertaken.

BLOOD-LOSS MONITOR

A new instrument for measuring the amount of blood lost by a patient during surgery has been devised by Dr. Harry H. Le-Veen, Chief of Surgery at the Veterans Administration Hospital, Brooklyn, New York.

The machine is about two feet square. Sponges and drapes used in surgery are dropped into a wire basket inside the machine and agitated in a measured amount of water to remove the blood. Other blood lost at the site of surgery is sucked into the same water through a tube. As the water changes because of the increasing amounts of the blood the machine translates the change into cubic centimeters of blood loss and the cumulative amount is measured on a dial at the front of the monitor.

VITAMIN B-12

The Veterans Administration has developed a new technique for determining the effectiveness of vitamin B-12. This is the administration of radioactive Vitamin B-12 and by the use of a scintiscanner determine the pick-up of the vitamin by the body.

VETERAN POPULATION

The veteran population at the end of the month of November 1957 was:

Korean Conflict—Total 5,235,000 (with service in World War II also—911,000) (no service in World War II 4,324,000); World War II—total 15,320,000; World War I—2,931,000; other Wars and Regular Establishment 130,000.

The average daily patient load in VA hospitals for the month of November was 112,595, and in non-VA hospitals 2,971.

GI LIFE INSURANCE

Veterans holding GI life insurance policies have the option of taking their regular annual dividends in cash or using them to guard against losing their insurance.

They may have the dividends held, with

interest, as a credit to pay the premium monthly in case the policyholder fails to pay it before the end of the 31-day grace period. This is done automatically if the policy holder does not elect another option.

NEW BOOKLET

Federal Benefits Available to Veterans and Their Dependents is a new booklet which has been prepared by the Veterans Administration to explain the nature of all major U. S. veterans' benefits, the eligibility requirements for each benefit, and where to apply.

This booklet is available through the Superintendents of Documents, Government Printing Office, Washington 25, D.C., for 15 cents a copy, with a 25 percent discount for 100 or more copies.

Miscellaneous

SOROCHE

Some of the causes of the disease called "soroche" by the Indians of South America—and commonly called mountain sickness by English-speaking peoples—are being revealed by a University of Wisconsin Medical School scientist, Dr. Enrique Valdivia, a native of Peru.

Indians of the high mountains of South America—some of whom have spent generations at altitudes up to 18,000 feet or more—have barrel chests and hearts much larger than the peoples inhabiting the low coastal areas of the same countries.

In his experiments with guinea pigs in a specially built decompression chamber, Dr. Valdivia has found that the right ventricle of the hearts of the guinea pigs enlarges greatly when the animals are taken from sea level pressures to pressures present at 18,000 feet.

This compensatory enlargement takes place within a period of six weeks and is apparently due to pulmonary hypertension and not general hypoxia. If it were the latter Dr. Valdivia said both sides of the heart would be affected.

Financial support for the research has

been supplied by the U. S. Air Force, the Muscular Dystrophy Association, and the Wisconsin Heart Association.

OLD-AGE AND SURVIVORS INSURANCE (SOCIAL SECURITY)

The administration of this program is not financed from funds appropriated by Congress but from trust funds. The budget does, however, require Congressional authorization.

Here are some interesting figures to consider:

Beneficiaries on the roll at year end
Benefit payments during the year (in millions)
Administration
Percentage relationship of administrative costs to
benefit payments

ciation to be held at the Hotel Statler in Washington, D.C., March 24, 25, and 26, will deal with subjects bearing directly on the biologic aspects of flight.

The fourth Louis H. Bauer lecture will be given by Dr. Rodolfo Margaria, distinguished professor of physiology and biochemistry at the University of Milan, Italy.

The president of the association is Captain Ashton Graybiel, MC, U. S. Navy, Director of Research at the U. S. Naval School of Aviation Medicine, Pensacola, Florida.

| | Actual 1957 | Estimate 1958 | Estimate 1959 |
|--|----------------|------------------|------------------|
| Beneficiaries on the roll at year end | 10,654,574 | 11,826,000 | 12,749,000 |
| Benefit payments during the year (in millions) | 6,515 | 7,880 | 8,500 |
| Administration | 121,500,000 | 135,690,000 | 133,300,000 |
| Percentage relationship of administrative costs to benefit payments | 1.86 | 1.72 | 1.56 |

AGING PROBLEM

Medicine will break the age barrier in the not too distant future, and we may find ourselves living to be 150 years old. But with no function in life after 65, we'll be saying that the last 100 years are the hardest, not the first. The problem is not that old people are increasing in number, but that most of them have no personal philosophy for old age, and our society has no role for them.—R. J. Blakley, addressing University of Michigan's Conference on Aging.

SYMPOSIUM

The Fourth Annual Surgery, Radiology, Pathology Symposium will be held at the University of Oklahoma School of Medicine, Oklahoma City, Oklahoma, on March 14 and 15. No registration fee is charged to members of the Armed Forces, interns and residents. Others may register for a fee of \$15.00.

Nine nationally prominent clinicians will participate and discuss the problems of the management of the pediatric surgical patient.

AERO MEDICAL ASSOCIATION MEETING

The scientific program of the twenty-ninth annual meeting of the Aero Medical Asso-

INDUSTRIAL HEALTH

An Industrial Health Conference will be held in Atlantic City, New Jersey, April 19-25. How to keep workers healthy and on the job through control of hazardous exposures in the working environment and provision of preventive medical services in industry will be the subject of the conference.

Further information may be obtained from Mrs. Tula S. Brocard, Publicity Chairman, Room 2029, Temporary R, 300 Independence Ave., S.W., Washington 25, D.C.

MEETING

The 35th annual Conference of the American Physical Therapy Association will be held at the Olympic Hotel in Seattle, Washington, June 15-20, 1958.

The scientific program will be centered on the neurophysiological basis for therapeutic exercise. Three of the newer concepts of exercise will be explored.

MEETING

The American Public Health Association has announced its 1958 meeting to be held October 27-31 at St. Louis, Missouri; and its 1959 meeting to be held October 19-23 at Atlantic City, N.J.

FHIAA NEWS ITEM

Norman E. Lindquist, president of the Federal Hospital Institute Alumni Association has appointed the following Special Committee to chart the future of the Alumni Association: Mr. Reuben Cohen, Chairman; Col. Levi M. Browning, Col. Frederick H. Gibbs, Mr. Dan Macer, Dr. Myron D. Miller, Col. Francis W. Regnier, Capt. Robert L. Ware.

Anyone desiring to communicate with the chairman may address him at: Veterans Administration Center, Kecoughtan, Virginia.

BLIND CHILDREN'S SERVICE

The Blind Children's Research Project for the emotionally disturbed and multiple handicapped has become a service of New York University-Bellevue Medical Center's Institute of Physical Medicine and Rehabilitation, New York City.

The services offered consist of play therapy and counselling for children and their parents, research, advanced professional training and public education. It is felt that in order to utilize the capacities of the blind child with multiple handicaps to their fullest, further study is necessary in areas of speech and development, social acceptance and relationships with other so-called normal children.

HOME STUDY IN ELECTROCARDIOGRAPHY

A *Basic Course* and an *Advanced Course* are offered in two home study courses in electrocardiography by the University of Southern California. For further information address: Office of the Director, Postgraduate Division, 2025 Zonal Ave., Los Angeles 33, Calif.

SPACE EXPLORATION

In one respect explorers of outer space have a bright future. They will never run out of space to explore. *Grit.*

TENSION

"Tension is a normal part of life. I wouldn't do away with it. Human beings for centuries have lived under tensions. Our American predecessors, pushing out into new frontiers, in constant fear for their own

lives, and those of relatives and friends, were under much greater mental strain than is almost anyone now."—Dr. Edgar V. Allen, Senior Consultant, Mayo Clinic; Past President, American Heart Association.

COLD SHOULDER

We recently read of a TV starlet being named *Miss Frozen Rabbit Meat of 1957*. Now will there be a *Miss Deep Freeze of 1958?*

ALCOHOLICS

In a study of 738 alcoholics made by Drs. O'Hollaren and Wellman of Seattle, Washington, 72.2% began drinking between the ages of 15 and 22. Nearly 85% of the 738 who were studied indicated that they were the youngest boy, the oldest boy, the youngest girl, the oldest girl or the only child.

GOOD SAMARITAN

America's love has never been equalled in human history. She turns her cheek seventy times seven. She fights only to defend her family. But when she has defeated her enemies, she binds their wounds, feeds the children, pays their bills and hands forth billions of dollars to restore them to an honorable place among the nations of the world.—EMMET McLAUGHLIN, *New Outlook*.

FILM

Dynamic Posture is a 24 minute, black and white, 16 mm. sound film, produced and narrated by M. Beckett Howorth, M.D., Clinical Professor of Orthopedic Surgery, New York University—Postgraduate Medical Center. The film is designed to teach good posture.

The film is distributed by the Association for the Aid of Crippled Children, Publications Office, 1790 Broadway, New York 19, N.Y.

RADIOACTIVE WASTE DISPOSAL

A volume, PB 131085 Special Report: A Survey of Radioactive Waste Disposal(U), is available from the OTS, U. S. Dep't. of Commerce, Washington 25, D.C. It contains 15 pages, price 50 cents.

O B I T U A R I E S

Capt. Nesmith P. Nelson, USAR, Ret.

Nesmith P. Nelson, Captain, Medical Corps, U. S. Army Reserve, Retired, died December 14, 1957, at Minneapolis, Minnesota, at the age of 80.

Dr. Nelson was born at Anoka, Minnesota. He received his medical degree from the George Washington University School of Medicine, Washington, D.C., in 1910. During World War I, he was commissioned in the U. S. Army Medical Corps Reserve and served on active duty. On April 1, 1953 he received his Honorable Discharge from the Armed Forces. In 1920 he went to Minneapolis for a year, then moved to Brainerd, Minnesota, until 1949. He practiced his specialty of eye, ear, nose and throat in Minneapolis and Brainerd until the time of his retirement in 1953.

He was a member of the Upper Mississippi Medical Society of which he was a past president, the American Medical Association, the Minnesota State Medical Association, George Washington University Medical Society, American Association of Ophthalmology, and the Association of Military Surgeons of the United States.

Doctor Nelson is survived by his wife, Rose, who resides at 3340 S. Blaisdell Ave., Minneapolis, Minnesota, and two sons, Floyd A., and Russell D.

Dr. Frederick W. Jackson

Dr. Frederick W. Jackson, retired director of the Federal Health Services of Canada and former deputy minister of health in Manitoba died January 10 at his home in Winnipeg, at the age of 69.

He was elected an honorary member of

the Association of Military Surgeons of the United States in 1941. He was a native of Stonewall, Manitoba and practiced privately in rural Manitoba from 1912 to 1927, except for four years' services with the Canadian forces in World War I.

In 1928 Dr. Jackson undertook a health survey for the provincial government and the following year became provincial director of preventive medicine. In 1931 he was appointed deputy minister of Health and Welfare. In 1943 he was chairman of a Royal Commission to investigate the health and welfare of Japanese people in interior settlements of British Columbia. In 1956 he became the first Canadian to receive the Sedgwick Memorial Medal for "distinguished service in public health." He was the recipient of the King George V silver medal and the King George VI Coronation medal for meritorious public service.

He is survived by a daughter, Mrs. J. A. Cowan, of Waterloo, Ontario, one brother and a sister.

Col. Eugene W. Billick, U. S. Army, Ret.

Eugene Wycoff Billick, Medical Corps, U. S. Army, Retired, died at Walter Reed Army Hospital, Washington, D.C., January 26 at the age of 61.

Colonel Billick was a native of Courtney, Pennsylvania. He received his medical degree from the University of Pittsburgh in 1925 and then entered the Army for his internship. Following this he was commissioned in the Regular Army Medical Corps and served until he was retired for physical disability in 1956.

During World War I he was an enlisted man from September 1918 to January 1919.

In World War II he was Chief Surgeon of the Africa-Middle East Theater. Prior to his Washington tour which was his last tour of active duty, Colonel Billick was Surgeon of the Fifth Army with headquarters at Chicago.

He was a graduate of the Army Medical and Medical Field Service Schools (1927), the Command and General Staff School (1936), and the Army War College (1939). He held the Legion of Merit and the United States Typhus Commission medals. He was

a member of the American Medical Association, the Association of Military Surgeons, and the Nu Sigma Nu medical fraternity.

Colonel Billick is survived by his widow, Katherine M. Billick, of 3362 South Wakefield Street, Arlington, Virginia; a daughter, Mrs. Thomas C. Whyte of Idaho Falls, Idaho; and two sons, Capt. Eugene W. Billick, Jr., of Fort Dix, New Jersey, and Pvt. John H. Billick, Fort Jackson, South Carolina. Interment was at Arlington National Cemetery.



ANNOUNCEMENT OF REGULAR CORPS EXAMINATION FOR CLINICAL
PSYCHOLOGISTS IN THE COMMISSIONED CORPS OF THE
UNITED STATES PUBLIC HEALTH SERVICE

Competitive Examinations for appointment of Clinical Psychologists as Regular Corps officers in the Commissioned Corps of the U. S. Public Health Service will be held on May 6, 7, 8, and 9, 1958, at a number of places throughout the United States. Places will be announced. Applications must be received no later than April 11, 1958, in the Office of the Surgeon General, U. S. Public Health Service, Washington 25, D.C. Application forms may be obtained from that office.

BOOK REVIEWS

CLINICAL CARDIOPULMONARY PHYSIOLOGY. Sponsored by the American College of Chest Physicians. Edited by Burgess L. Gordon, M.D. 768 pages, illustrated. Grune & Stratton, Inc., New York and London. 1957. Price \$15.75.

In the words of Burgess L. Gordon, M.D., Editor in Chief of this book, "Clinical cardiopulmonary physiology is a rich but uncharted field. An enormous pool of physiologic data, graphs and formulas is available in the scientific literature. But unfortunately this important fund of information is not fully utilized by the clinician." It is the purpose of this book to bring much of the newer and more valuable physiologic data to the practicing chest physician in a logical, dynamic manner.

The task is Herculean; authorities in both basic research and clinical specialties have contributed articles. The book has a natural and well organized progression of material, generally introducing basic concepts and developing their clinical application. Some subjects are touched on comparatively lightly, and fail to answer some more detailed questions. However, the excellent bibliographies at the end of most of the chapters give the reader the source of more detailed information if he should desire it.

In the field of cardiopulmonary physiology where recent advances have changed our concepts of physiopathology and therapy, the functional approach of this book is most timely. It will help bridge the gap between basic research and clinical practice and is highly recommended reading for chest clinicians.

MAJOR ROBERT B. STONEHILL, USAF(MC)

THE MALABSORPTION SYNDROME. A Mount Sinai Hospital Monograph. Edited by David Adlersberg, M.D., Associate Attending Physician for Metabolic Diseases, The Mount Sinai Hospital, New York; 19 contributors. 252 pages, illustrated. Grune & Stratton, New York and London. 1957. Price \$5.50.

The Malabsorption Syndrome which includes celiac disease, tropical and non-tropical sprue is presented in a most instructive and comprehensive manner by Dr. Adlersberg and his associates.

The symposium begins with a review of the physiology of intestinal absorption, the mechanisms involved in digestion and absorption of protein, fats, carbohydrates, water and minerals. This is followed by a discussion of disturbances in protein and lipid metabolism, water and electrolyte upsets in the malabsorption syndrome. There is an excellent review of the current knowledge of B_{12} metabolism and the clinical changes which result from its

malabsorption in this syndrome and other abnormal states that result from deficient pancreatic secretions.

The pathosis, clinical picture and therapy of the malabsorption syndrome are well correlated and important features are emphasized by comprehensive tables, clear cut illustrations, and detailed case illustrations. There are special chapters devoted to bone marrow, blood, neurologic, osseous and radiologic changes that comprise the altered physiology of the malabsorption syndrome. Finally, there is an excellent presentation of malabsorption problems following extensive small intestinal resection, a problem which is becoming more frequent in these days of radical surgery.

Dr. Adlersberg is to be congratulated for the skillful way he has integrated the contributions of the several authors of this symposium. Each chapter furnishes a full list of references, well selected illustrations, and most instructive tables.

This book will appeal mainly to internists and gastro-enterologists, but there is much of interest in this symposium for the physiologist, radiologist, hematologist and abdominal surgeon.

CAPT. JULIAN LOVE, MC, USN, RET.

FLUID AND ELECTROLYTES IN PRACTICE. 2nd Ed. By Harry Statland, M.D., Associate in Medicine, University of Kansas School of Medicine. 229 pages. J. B. Lippincott Company, Philadelphia and Montreal. 1957. Price \$6.00.

This book represents a most welcome addition to the voluminous literature concerning fluid and electrolyte problems. The material is presented in an informal, easily read manner, generously interspersed with practical charts and graphs wherever applicable.

The first section of this book reviews the physiology and function of body fluids with particular emphasis on the proper management of the surgical patient. In the second part of the book, the author discusses the proper management of special disease states.

The bibliography, while admittedly not comprehensive, is extensive enough to include representative selection of articles of primary importance in this particular field. The bibliography is broken down into various sections, which makes it easy for the reader to refer to any desired section.

The book represents a simple and concise summary of the important aspects of fluid and electrolyte therapy and should be received with great enthusiasm by all practicing clinicians.

LT. COL. ROBERT PILLSBURY, MC, USA

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